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FIGURE 1

Human G Protein Coupled Receptor Family
 (Receptors known as of January, 1999)

CLASS	LIGAND	NUMBER	TISSUE	PHYSIOLOGY	THERAPEUTICS
•Class I Rhodopsin like	•Amine				
	•Acetylcholine (muscarinic & nicotinic)	5	Brain, Nerves, Heart	Neurotransmitter	Acuity, Alzheimer's
	•Adrenoceptors				
	•Alpha Adrenoceptors	6	Brain, Kidney, Lung	Gluconeogenesis	Diabetes, Cardiovascular
	•Beta Adrenoceptors	3	Kidney, Heart	Muscle Contraction	Cardiovascular, Respiratory
	•Dopamine	5	Brain, Kidney, GI	Neurotransmitter	Cardiovascular, Parkinson's
	•Histamine	2	Vascular, Heart, Brain	Vascular Permeability	Anti-inflammatory, Ulcers
	•Serotonin (5-HT)	16	Most Tissues	Neurotransmitter	Depression, Insomnia, Analgesic
	•Peptide				
	•Angiotensin	2	Vascular, Liver, Kidney	Vasoconstriction	Cardiovascular, Endocrine
	•Bradykinin	1	Liver, Blood	Vasodilation,	Anti-inflammatory, Asthma
	•C5a anaphylatoxin	1	Blood	Immune System	Anti-inflammatory
	•Fmet-leu-phe	3	Blood	Chemoattractant	Anti-inflammatory
	•Interleukin-8	1	Blood	Chemoattractant	Anti-inflammatory
	•Chemokine	6	Blood	Chemoattractant	Anti-inflammatory
	•Orexin	2	Brain	Fat Metabolism	Obesity
	•Nociceptin	1	Brain	Bronchodilator, Pain	Airway Diseases, Anesthetic
	•CCK (Gastrin)	2	Gastrointestinal	Motility, Fat Absorption	Gastrointestinal, Obesity, Parkinson's
	•Endothelin	2	Heart, Bronchus, Brain	Muscle Contraction	Cardiovascular, Respiratory
	•Melanocortin	5	Kidney, Brain	Metabolic Regulation	Anti-inflammatory, Analgesics
	•Neuropeptide Y	5	Nerves, Intestine, Blood	Neurotransmitter	Behavior, Memory, Cardiovascular
	•Neurotensin	1	Brain,	CNS	Cardiovascular, Analgesic
	•Opioid	3	Brain,	CNS	Depression, Analgesic
	•Somatostatin	5	Brain, Gastrointestinal	Neurotransmitter	Oncology, Alzheimer's

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•Class II
Secretin like

•Secretin	1	Gastrointestinal, Heart	Digestion	Obesity, Gastrointestinal
•Calcitonin	1	Bone, Brain	Calcium Resorption	Osteoporosis
•Corticotropin releasing factor/urocortin	1	Adrenal, Vascular, Brain	Neuroendocrine	Stress, Mood, Obesity
•Gastric inhibitory peptide (GIP)	1	Adrenals, Fat Cells	Sugar/Fat Metabolism	Diabetes, Obesity
•Glucagon	1	Liver, Fat Cells, Heart	Gluconeogenesis	Cardiovascular
•Glucagon-like Peptide 1 (GLP-1)	1	Pancreas, Stomach, Lung	Gluconeogenesis	Cardiovascular, Diabetes, Obesity
•Growth hormone-releasing hormone	1	1	Brain	Neuroendocrine Growth Regulation
•Parathyroid hormone	1	Bone, Kidney	Calcium Regulation	Osteoporosis
•PACAP	1	Brain, Pancreas, Adrenals	Metabolism	Metabolic Regulation
•Vasoactive intestinal polypeptide (VIP)	1	Gastrointestinal	Motility	Gastrointestinal
•Metabotropic Glutamate	7	Brain	Sensory Perception	Hearing, Vision
•GABA _B	1	Brain	Neurotransmitter	Mood Disorders
•Extracellular Calcium Sensing	1	Parathyroid, Kidney, GI Tract	Calcium Regulation	Cataracts, GI Tumors

•Class III

Figure 2

G protein-coupled receptors:

(Division into Class A

Or Class B)

1. **A1 adenosine receptor** [Homo sapiens]. ACCESSION AAB25533
npivyaf riqkfrvtfl kiwndhfrcq pappidedlp eerpdd
Class A
2. **adrenergic, alpha -1B-, receptor** [Homo sapiens]. ACCESSION NP_000670
npiypcsskefkrafvrlgcqcrgrgrmmrrllggcaytyrptwtrggslersqsrkdslddsgscslsgsqrtpslaspspgylgrgap
ppvelcafpewkapgallslpapeppgrgrhdsgplftklktepspgtdggasnggceaaadvangqpgfksnmplapggf
Class A
3. **adrenergic receptor alpha-2A** [Homo sapiens]. ACCESSION AAG00447
npviytfnhdfirafrkklcrgdrkriv
Class A
4. **alpha-2B-adrenergic receptor** - human. ACCESSION A37223
npviytfinqdfirafrilcrpwtqtaw
Class A
5. **alpha-2C-adrenergic receptor** - human. ACCESSION A31237
npviytfvfnqdfirpsfkhlfrmrgrfrq
Class A
6. **beta-1-adrenergic receptor** [Homo sapiens]. ACCESSION NP_000675
npiiyrcspdfrikafqglccarraarrhathgdrprasglarpgpppsgaasddddddvvgatpparlllepwcnggaaads
d ssldepcrpgfaseskv
Class A
7. **beta-2 adrenergic receptor**. ACCESSION P07550
npliycrspdfriaqfcllrsslkayngyssngntgeqsgyhveqekenklcedlpgtedfvghqgtvpsdnidsqgrncstnd
sll
Class A
8. **dopamine receptor D1** [Homo sapiens]. ACCESSION NP_000785
npiiyafnadfrkafstllgcyrllcpatnnaletvsinnngaamfsshheprgsiskecnlyliphavgssedlkkeeaagiaplekls
palsvildytdvslakiqpitqngqhpt
Class A
9. **D(2) dopamine receptor**. ACCESSION P14416
npiiyttfniefrikafklilhc
Class A

10. **d3 dopamine receptor - human.** ACCESSION G01977
npviyttfniefkafkilsclsc
Class A
11. **dopamine receptor D4 - human.** ACCESSION DYHUD4
npviytfvnaefrnvfrkralracc
Class A
12. **dopamine receptor D5 - human.** ACCESSION DYHUD5
npviyafnadfqkvfaqlgshfcsrtpvtnisnelisynqdivfhkeiaaayihmmpnavtpgnrevdndeeegpfdrmfqi
yqtspdgdpvaesvwelcdcegeisldkitpftpngfh
Class A
13. **muscarinic acetylcholine receptor M1 [Homo sapiens].** ACCESSION NP_000729
nmpcyalcnkaftrdfrlllcrwdkrrwrkipkrpgsvhrtpsrqc
Class A
14. **muscarinic acetylcholine receptor M2 [Homo sapiens].** ACCESSION NP_000730
npacyalcnatfkktfkhllmchyknigatr
Class A
15. **muscarinic acetylcholine receptor M3 [Homo sapiens].**
npvcyalcnktfrttfkmlllcqcdkkrkqqyqqrsvifhkrapeqal
Class A
16. **muscarinic acetylcholine receptor M4 [Homo sapiens].** ACCESSION NP_000732
npacyalcnatfkktfrhlllcqyrnigtar
Class A
17. **m5 muscarinic receptor.** locus HUMACHRM ACCESSION AAA51569
npicyalcnrtfrktfkmlllcrwkkkkveeklywqgnsklp
Class A
18. **5-hydroxytryptamine (serotonin) receptor 1A [Homo sapiens].** ACCESSION BAA90449
npviyayfnkdfqnafkkiickcf
Class A
19. **5-hydroxytryptamine (serotonin) receptor 1B [Homo sapiens].** ACCESSION BAA94455
npiiytmsnedfkqafhklirfkets
Class A
20. **5-hydroxytryptamine (serotonin) receptor 1E [Homo sapiens].** ACCESSION BAA94458
npilytsfinedfklafkkliircr
Class A
21. **OLFACTORY RECEPTOR 6A1.** ACCESSION O95222

npiiyclmqevkralccilhlyqhdpdpkkgssrnv

Class A

22. OLFACTORY RECEPTOR 2C1. ACCESSION O95371

npliyltnmevkgalrrllgkgrevg

Class A

23. angiotensin receptor 1 [Homo sapiens]. ACCESSION NP_033611

npifygflgkfkryflqllkyippkakshsnlstkmsflsyprsdnvssstkkpapkfeve

Class B

24. angiotensin receptor 2 [Homo sapiens]. ACCESSION NP_000677

npflycfvgnrffqqklrsvfrvpitwlqgkresmscrkssslremetfvs

Class B

25. interleukin 8 receptor beta (CXCR2) [Homo sapiens]. ACCESSION NM_001557

NPLIYAFIGQKFRHGLLKILAIHGLISKDSLKPDSRPSFVGSSSGHTSTTL

Class B

26. cx3c chemokine receptor 1 (cx3cr1) (fractalkine receptor)

ACCESSION P49238

npliyafagekfrrylyhlygkclavlcgrsvhvfsssesqsrhgsvglssnftyhtsdgdallll

Class B

27. neurotensin receptor - human. ACCESSION S29506

n pilynlvsanfrhiflatlclcpvwrrrrkrpafsrkadsvssnhflssnatretly

Class B

28. SUBSTANCE-P RECEPTOR (SPR) (NK-1 RECEPTOR) (NK-1R). ACCESSION P25103

npiiycclnldrfrlfgfkhafrccpfisagdyeglemkstrylqtqgsvykvsrlettistvvgahceepedgpkatpssldltsncssrsd
sktmtesfsfssnvl

Class B

29. vasopressin receptor type 2 [Homo sapiens]. ACCESSION AAD16444

npwiyasfsssvsselrslccargrtppslgpqdesctassslakdtss

Class B

30. thyrotropin-releasing hormone receptor - human. ACCESSION JN0708

npviynlmsqkfraafkrklcnckqkptekpanysvalnysvikesdhfsteldditvtdtylsafkvsfddtclasevvsfsqs

Class B

31. oxytocin receptor - human. ACCESSION A55493

npwiymlftghlfhelvqrfccsasyllkgrrlgetsaskksnsssfvlshrsssqscsqpsta

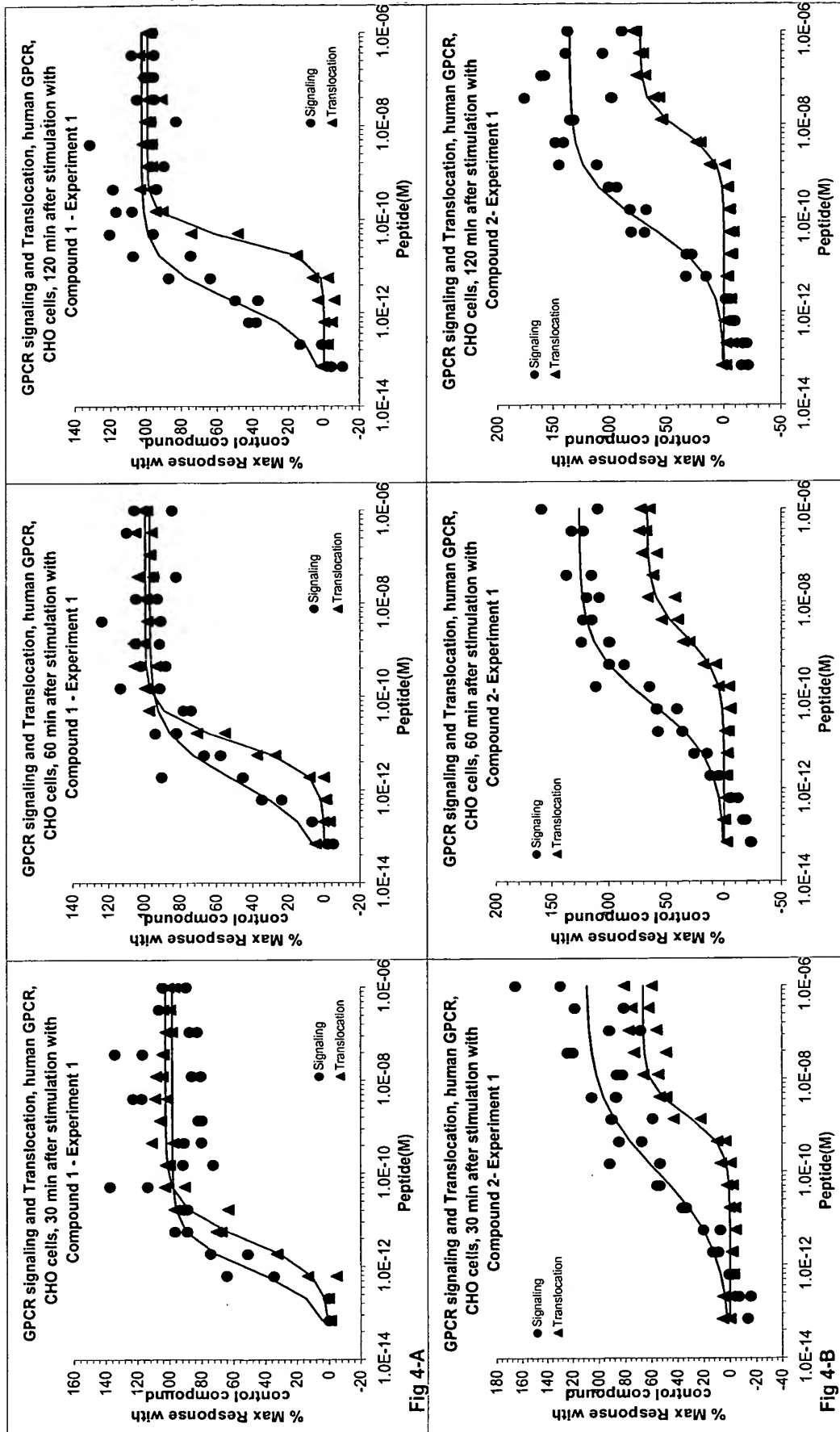
Class B

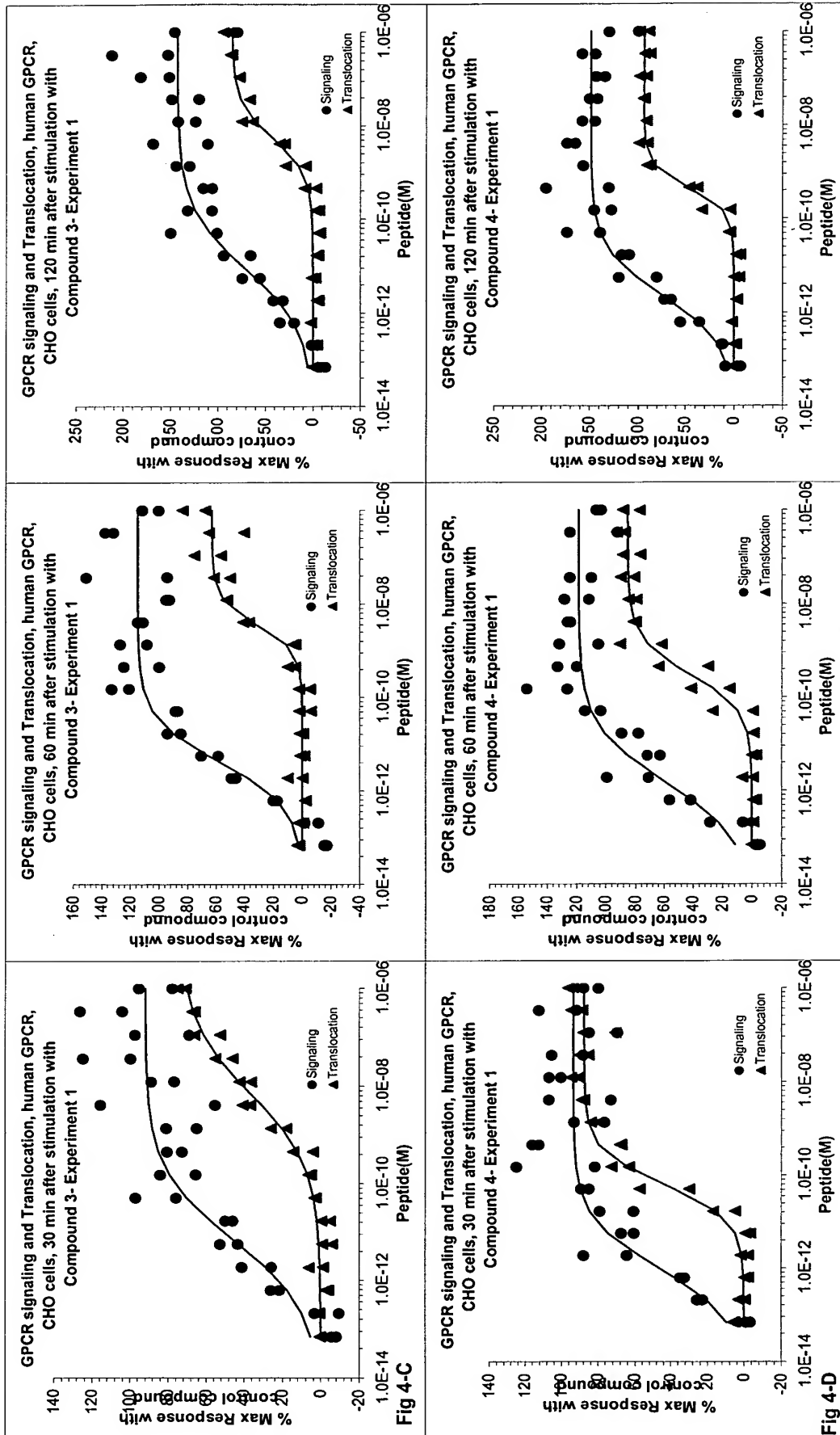
32. **neuromedin U receptor 1 [Homo sapiens].** ACCESSION AAG24793
nplvylsmssrfretfqealcgacchrlrprhsshslsrmttgstlcdvsglsgswvhplagndgpeaqqetdps
Class B
33. **gastrin receptor.** ACCESSION AAC37528
nplvycfmhrrfrqacletcarccprpprarpralpdedpptpsiaslsrlyttistlgpg
Class B
34. **galanin receptor 3 [Homo sapiens].** ACCESSION 10879541
nplvyalasrhfrarfrlwpcgrrrhrarralrrvrpassgppgpcgdarpsgrllagggqgpepregpvhggeaargpe
Class A
35. **edg-1 - human.** ACCESSION A35300
npiiytltnkemrrafirmsckcpgdsagkfkpiagmefsrsksdnsshpkdegdnpetimssgnvnss
Class A
36. **central cannabinoid receptor [Homo sapiens].** ACCESSION NP_057167
npiiyalrskdlrhafrsmfpccegtaqpldnsmgdsdclhkhannaasvhraescikstvkiakvtnsvstdtsaeal
Class A
37. **delta opioid receptor - human.** ACCESSION I38532
nplvyafldenfkrcfrqlcrkpcgrdpssfsrpreatarervtactpsdggpggraa
Class A
38. **proteinase activated receptor 2 (PAR-2) human.** ACCESSION P55085
dpfvyyfvshdfrdhaknallcrsvrtvkqmqvsltskkhsrksssysssttvktsy
Class B
39. **vasopressive intestinal peptide receptor (VIPR) rat.** ACCESSION NM_012685
NGEVQAELRRKWRRWHLQGVLGWSSKSQHPWGGSNATCSTQVSMLTRVSPSARR
SSSFQAEVSLV
Class B

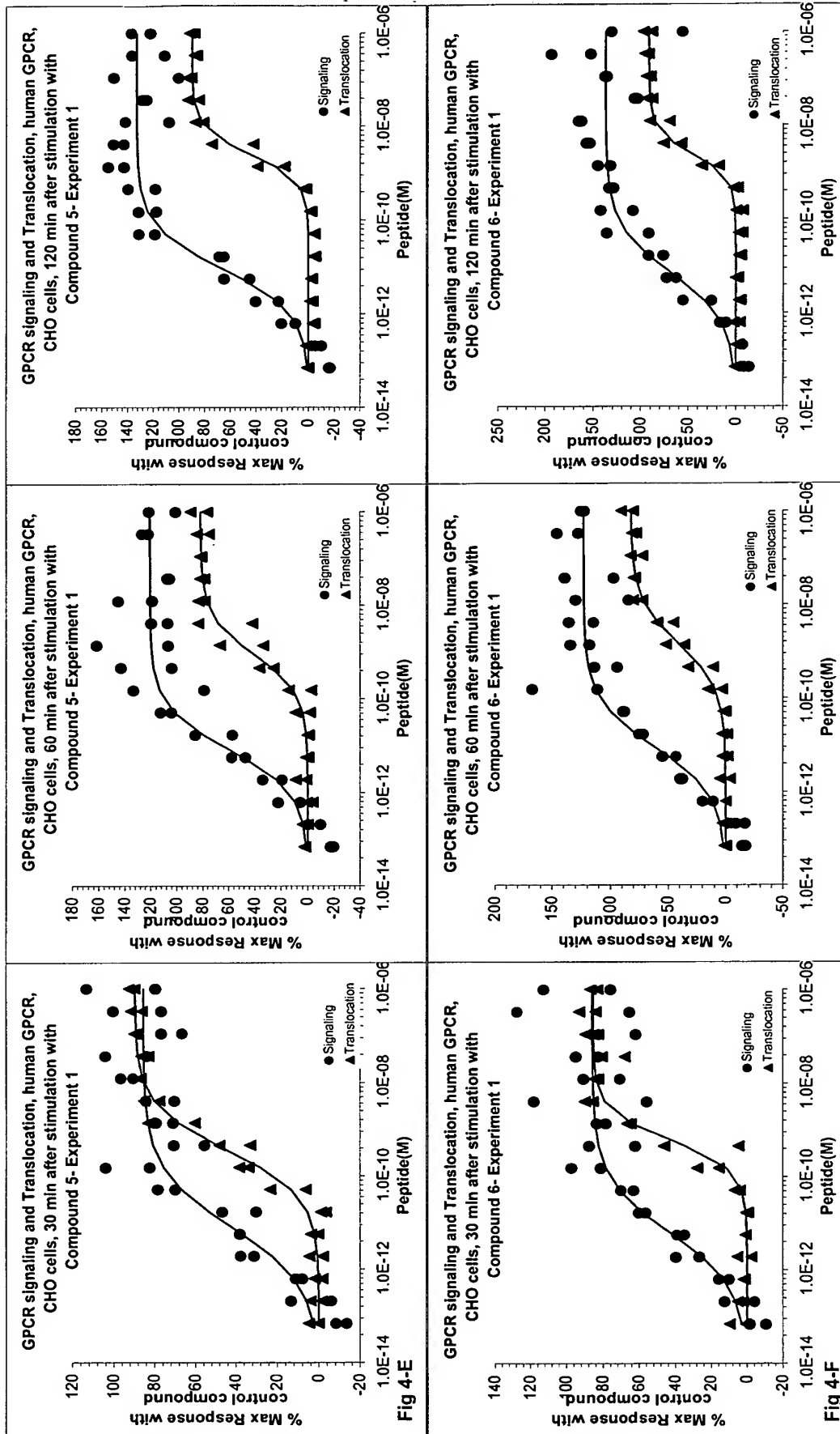
	A	B	C
1	GPCR Agonist	Generic Name	Brand Name
2	5-HT		
3	5-HT-1B/1D	Zolmitriptan	Zomig
4		Rizatriptan	Maxalt
5		Eletriptan	Relpax
6		Trazodone	Desyrel
7	5-HT-1D	Sumatriptan	Imitrex (P)
8		Naratriptan	Amerge
9		Almotriptan	Axert
10	5-HT-1B/1A	Frovatriptan	Frova
11			
12	5-HT-1A	Buspirone	BuSpar
13	5-HT-1A	Buspirone	Generic
14	5-HT-1A	Ziprasidone	Geodon
15			
16	5-HT-4	Tegaserod	Zelnorm
17	5-HT-4	Mosapride	Gasmotin
18	5-HT-4	Cisapride	Propulsid
19			
20	5-HT-2A/2C	Clozapine	Clozaril
21			
22	5-HT-2 / Dopa D1	Femoldopam	Corlopam
23			
24	5-HT/ Opioid u	Tramadol	Ultram
25	5-HT/ Opioid u	Tramadol	Ultracet
26	5-HT/ Opioid u	Tramadol	Generic
27			
28	Opioid		
29	Opioid	Codeine	Generic
30		Hydrocodone	Generic
31		Hydromorphone	Dilaudid
32		Levorphanol	Levo-Dromoran
33		Morphine	MS Contin
34		Morphine	Generic
35		Oxycodone	OxyContin
36		Oxycodone/APAP	Generic
37		Oxymorphone	Numorphan
38		Alfentanil	Alfenta
39		Fentanyl	Duragesic
40		Fentanyl	Sublimaze
41		Meperidine	Demerol
42		Sufentanil	Sufenta
43		Levomethadyl	Orlaam
44		Methadone	Dolophine
45		Propoxyphene	Darvon
46		Buprenorphine	Transtec
47		Remifentanil	Ultiva
48			
49	5-HT/ Opioid u	Tramadol	Ultram
50	5-HT/ Opioid u	Tramadol	Ultracet
51	5-HT/ Opioid u	Tramadol	Generic
52		Fig 3, page 1 of 3	

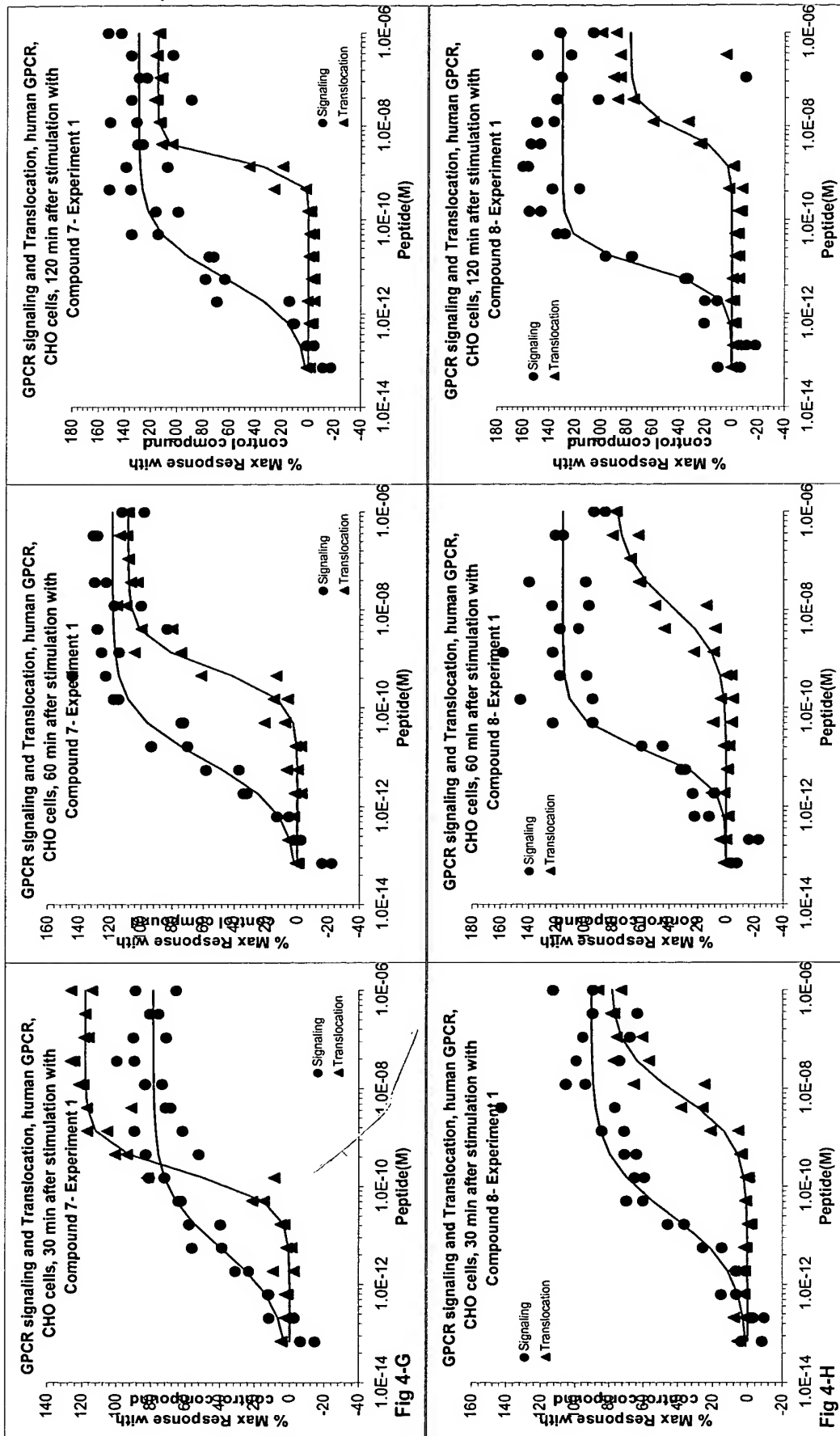
	A	B	C
1	GPCR Agonist	Generic Name	Brand Name
53	ADO		
54	ADO (mixed)	Adenosine	Adenocard
55		Adenosine	Adenoscan
56			
57	Adrenoceptor		
58	Adrenoceptor	Methylphenidate	Generic
59	Beta (mixed)	Isoproterenol	Isuprel
60		Ephedrine	Generic
61		Mephentermine	Wyamine
62	Beta-1	Norepinephrine	Levophed
63			
64	Beta-2	Salmeterol	Serevent
65		Salmeterol/ fluticasone	Advair
66		Albuterol, Aerosol	Generic
67		Albuterol, Sulfate	Generic
68		Albuterol	Proventil
69		Bitolterol	Tornalate
70		Isoetharine	Isoetharine
71		Metaproterenol	Alupent
72		Pirbuterol	Maxair
73		Formoterol	Foradil
74		Formoterol,	Oxis
75		Albuterol	Ventolin HFA
76		Bambuterol	Bambec
77		Salbutamol	Inspiryl Turbuhaler
78		Terbutaline	Brethine
79		Terbutaline	Terbutaline
80	H1 (-) / Beta-2 (+)	loratadine/ pseudoephedrine	Claritin-D
81	H1 (-) / Beta-2 (+)	Fexofenadine/ pseudoephedrine	Allegra-D
82		Terbutaline	Brethine
83	Alpha-Beta (mixed)	Metaraminol	Aramine
84		Epinephrine	Generic
85	Alpha (mixed)	Methoxamine	Vasoxyl
86		Phenyephine	Neo-Synephrine
87	Alpha-1	Modafinil	Provigil
88		Midodrine	ProAmatine
89			
90	Alpha-2	Guanfacine	Tenex
91		Tizanidine SR	Sirdalud CR
92		Moxonidine	Physiotens
93		Dexmedetomidine	Precedex
94		Brimonidine	Alphagen
95		Apraclonidine	Iopidine
96		Fig 3, page 2 of 3	

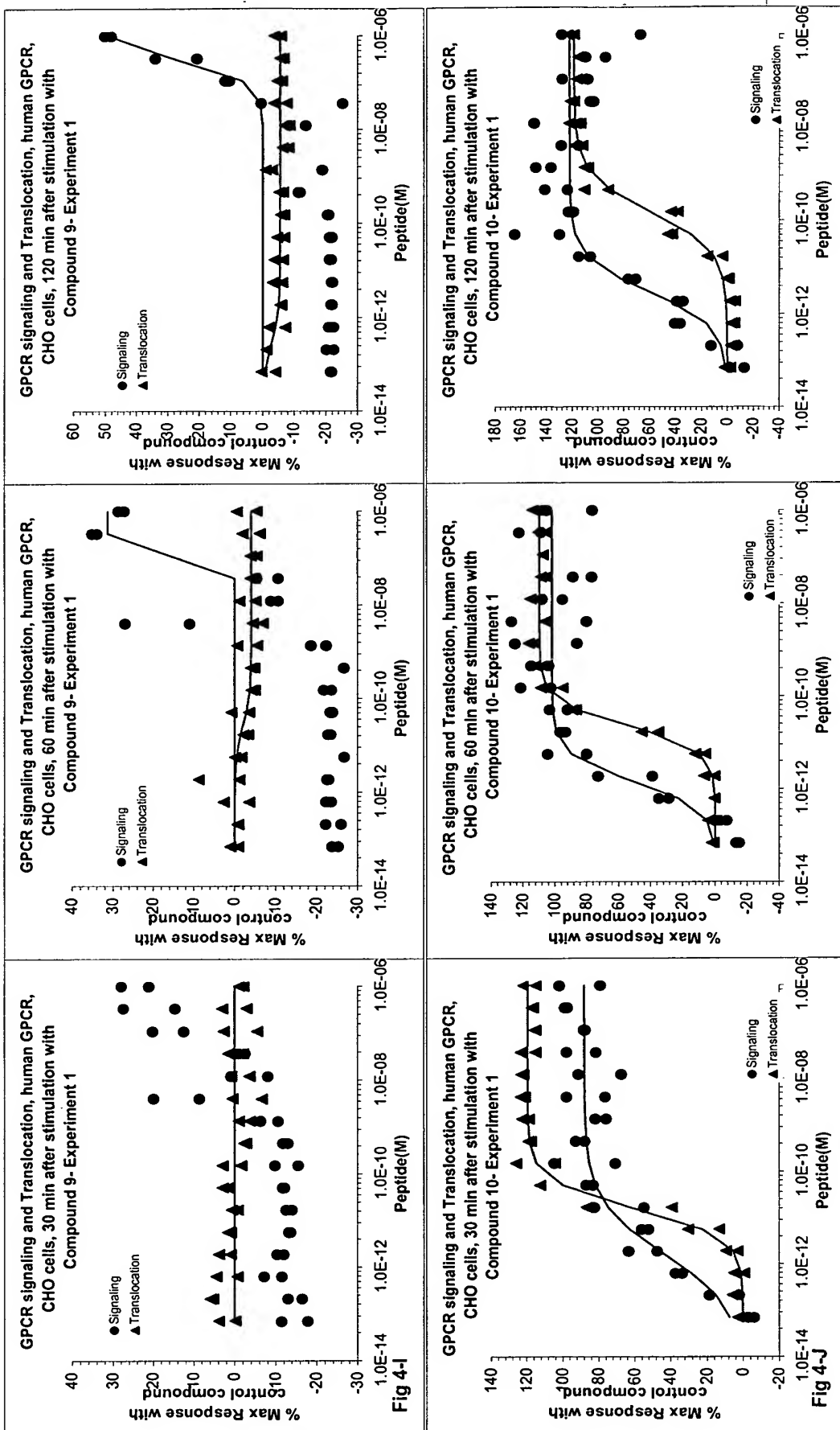
	A	B	C
1	GPCR Agonist	Generic Name	Brand Name
97			
98	Acetylcholine	Bethanechol	Generic
99	Muscarinic AC	Pilocarpine	Salagen
100	Muscarinic AC	Levetiracetam	Keppra
101			
102	Dopamine		
103	Dopamine (mixed)	Dopamine	Intropin
104	D1	Femoldopam	Corlopam
105	D2	Apomorphine	Ixense
106	D2/D3	Ropinirole	Requip
107	D2/D3	Pramipexole	Mirapex
108	D2/D3	Amisulpride	Solian
109	D2 Type	Bromocriptine	Parlodel
110	D1/D2	Pergolide	Permax
111			
112	Prostaglandin F2a (PG F2a)	Latanoprost	Xalatan
113	Prostaglandin F2a (PG F2a)	Unknown	Travatan
114	Prostaglandin E1 (PGE1)	Alprostadil	Befar
115			
116	Gonadotropin-releasing hormone (GnRH)	LHRH agonist	TRELSTAR LA
117	GnRH	Leuprolide	Lupron Depot
118			
119			
120	Calcitonin	Calcitonin	
121		Fig 3, page 3 of 3	

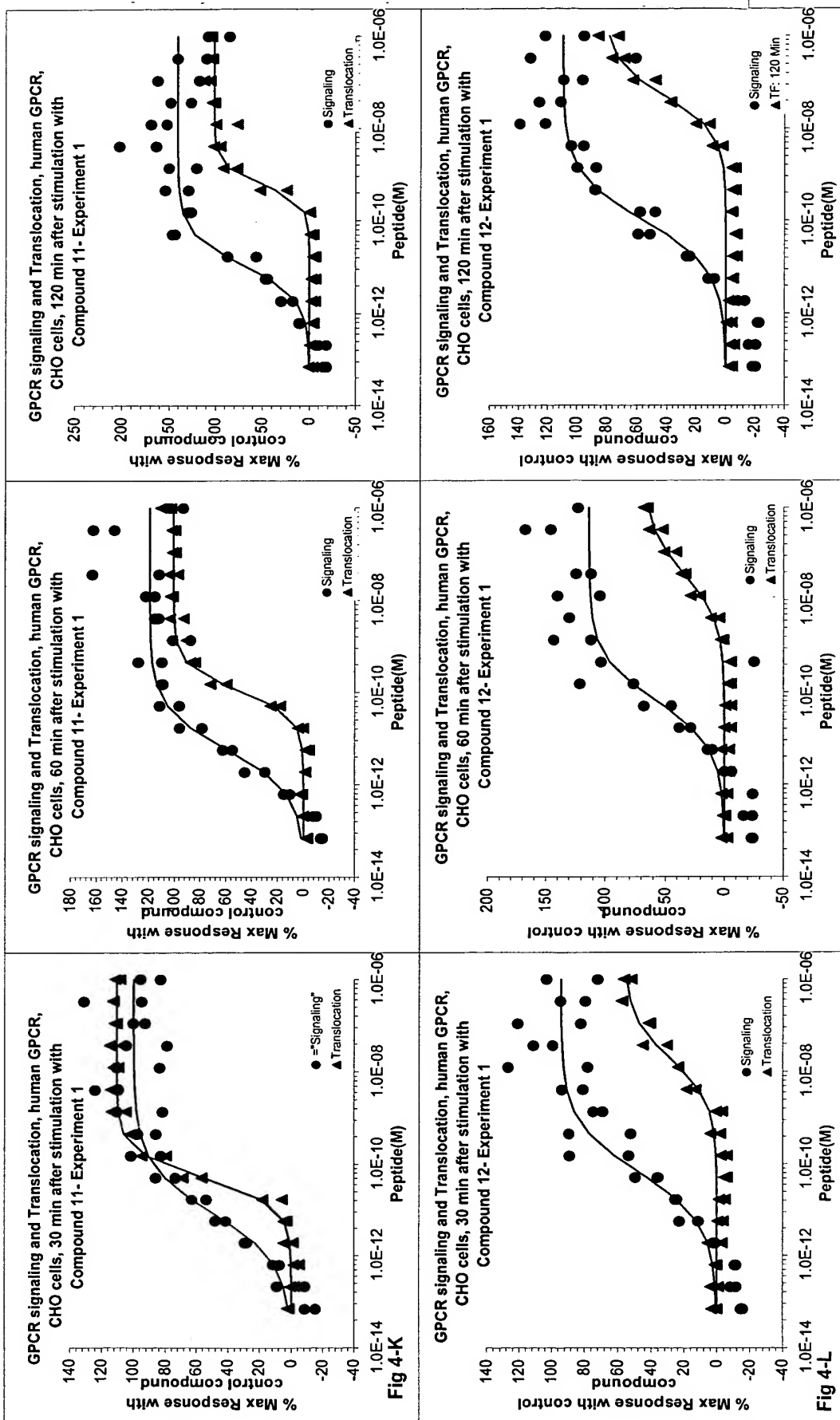


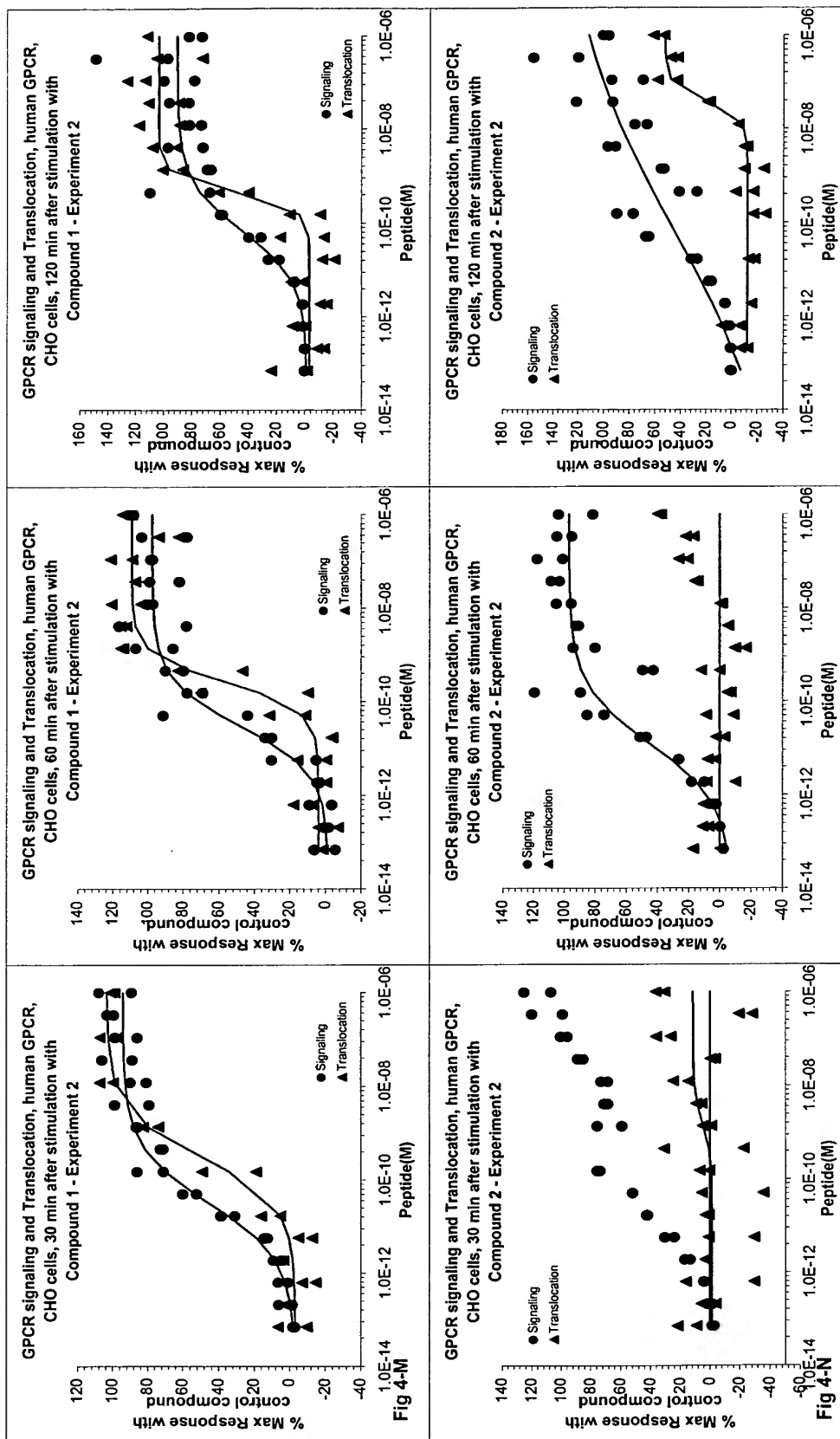


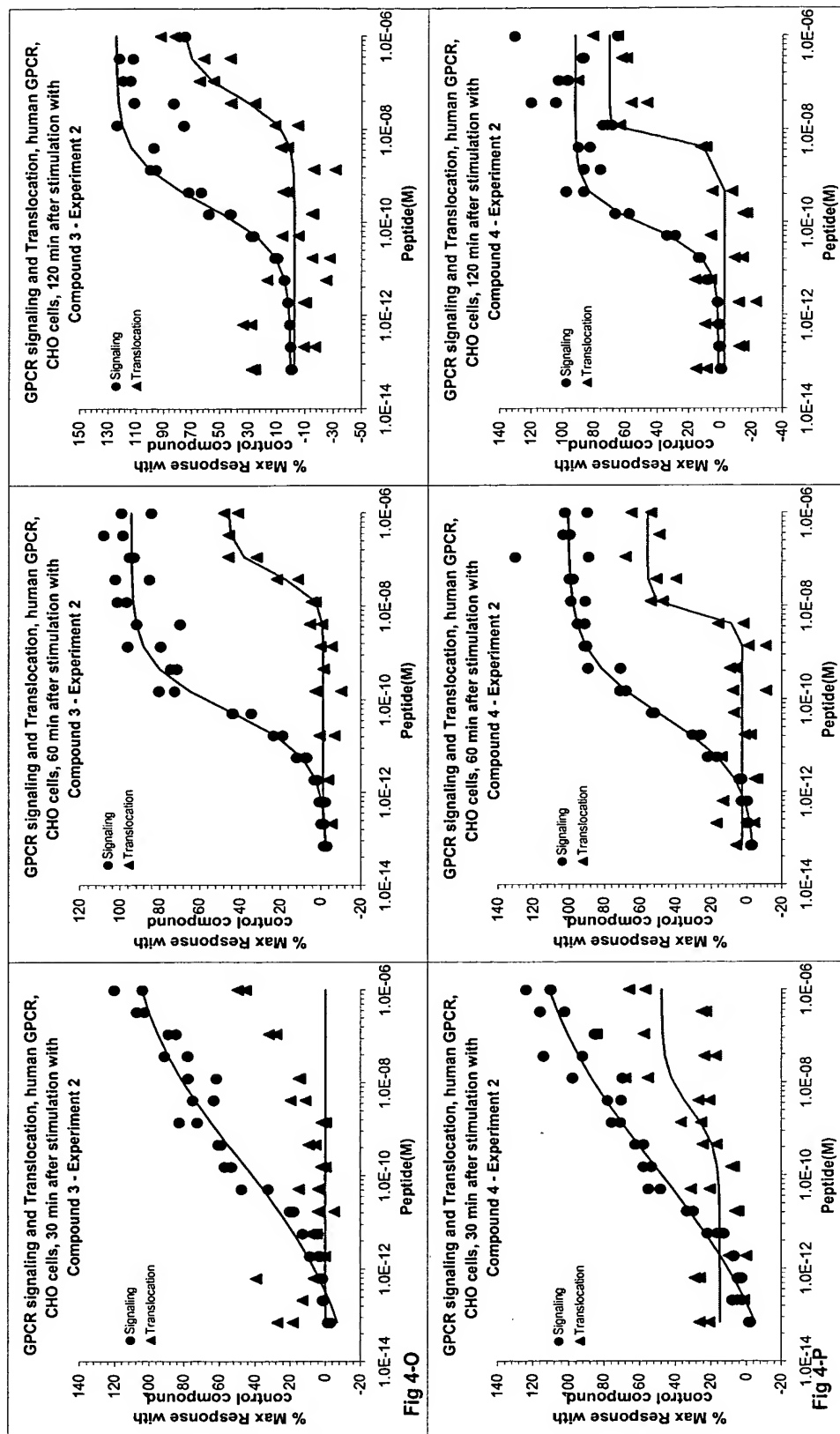


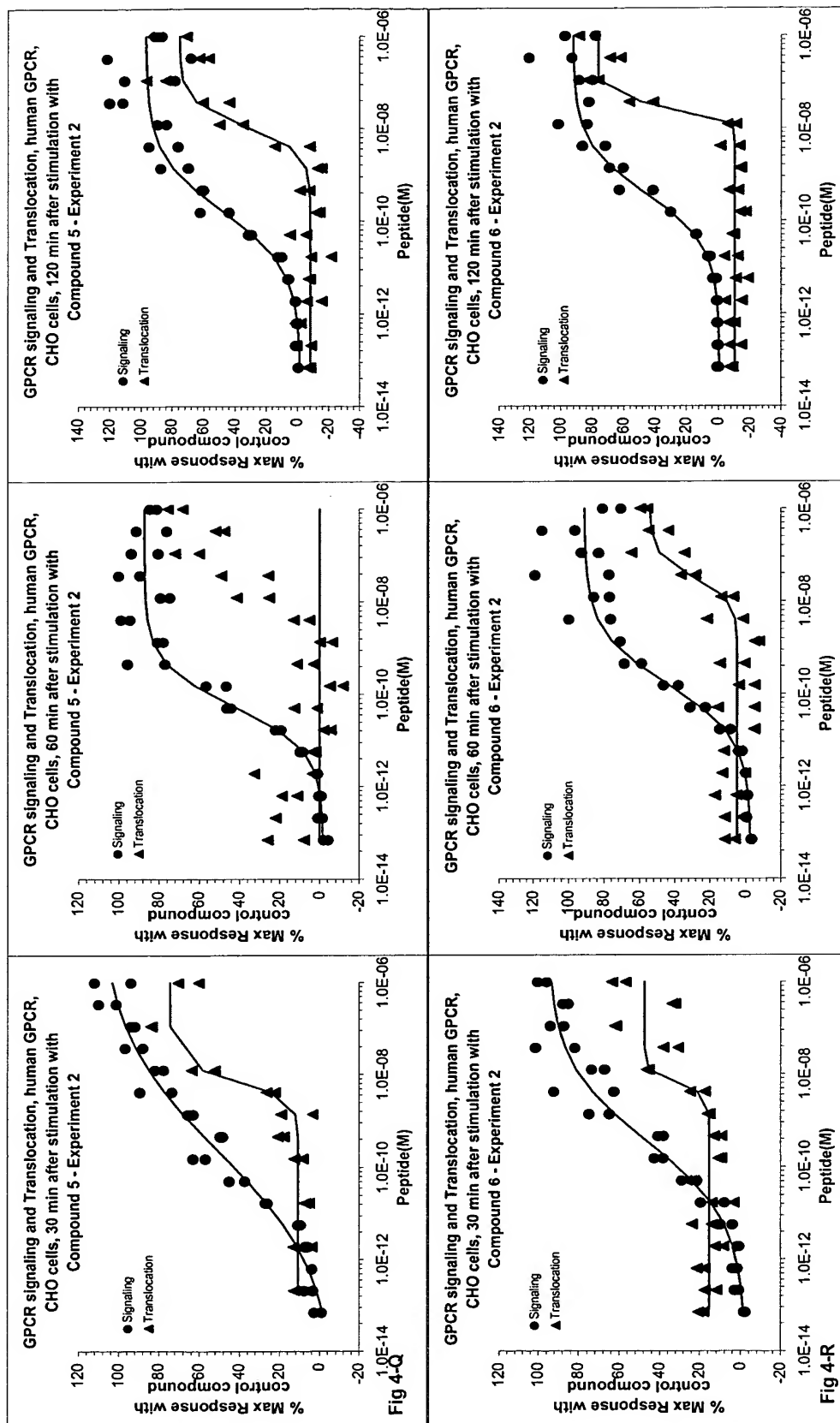


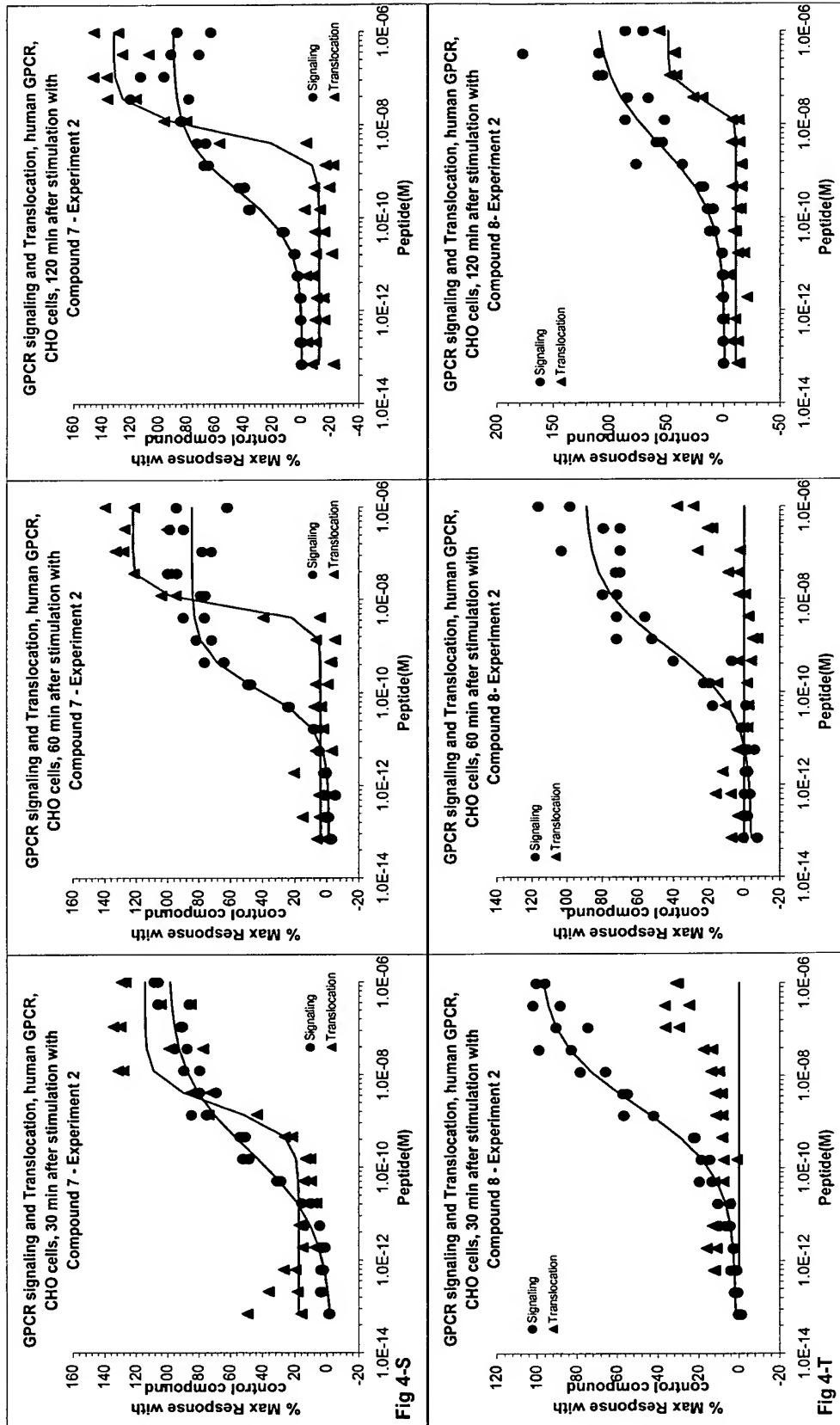


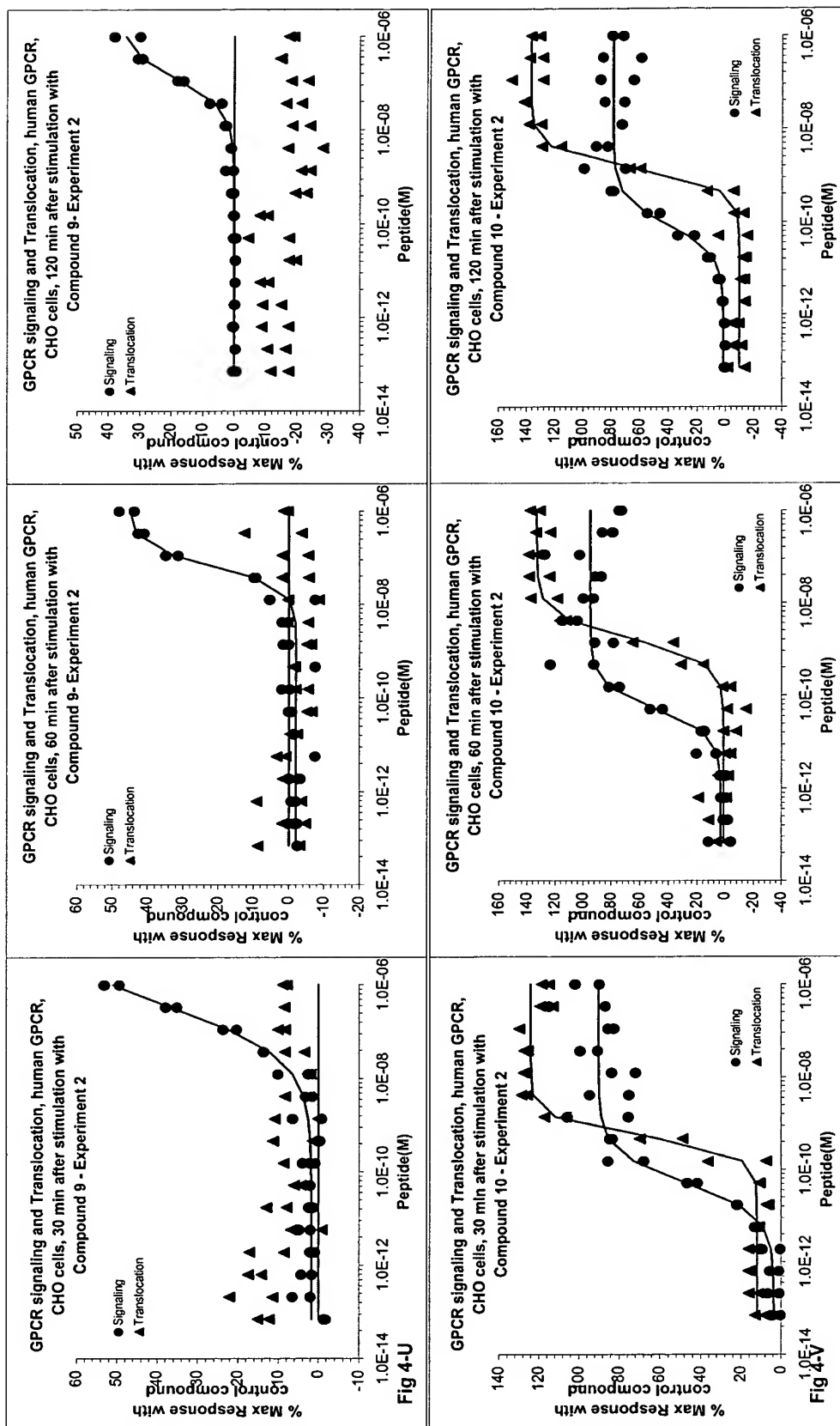


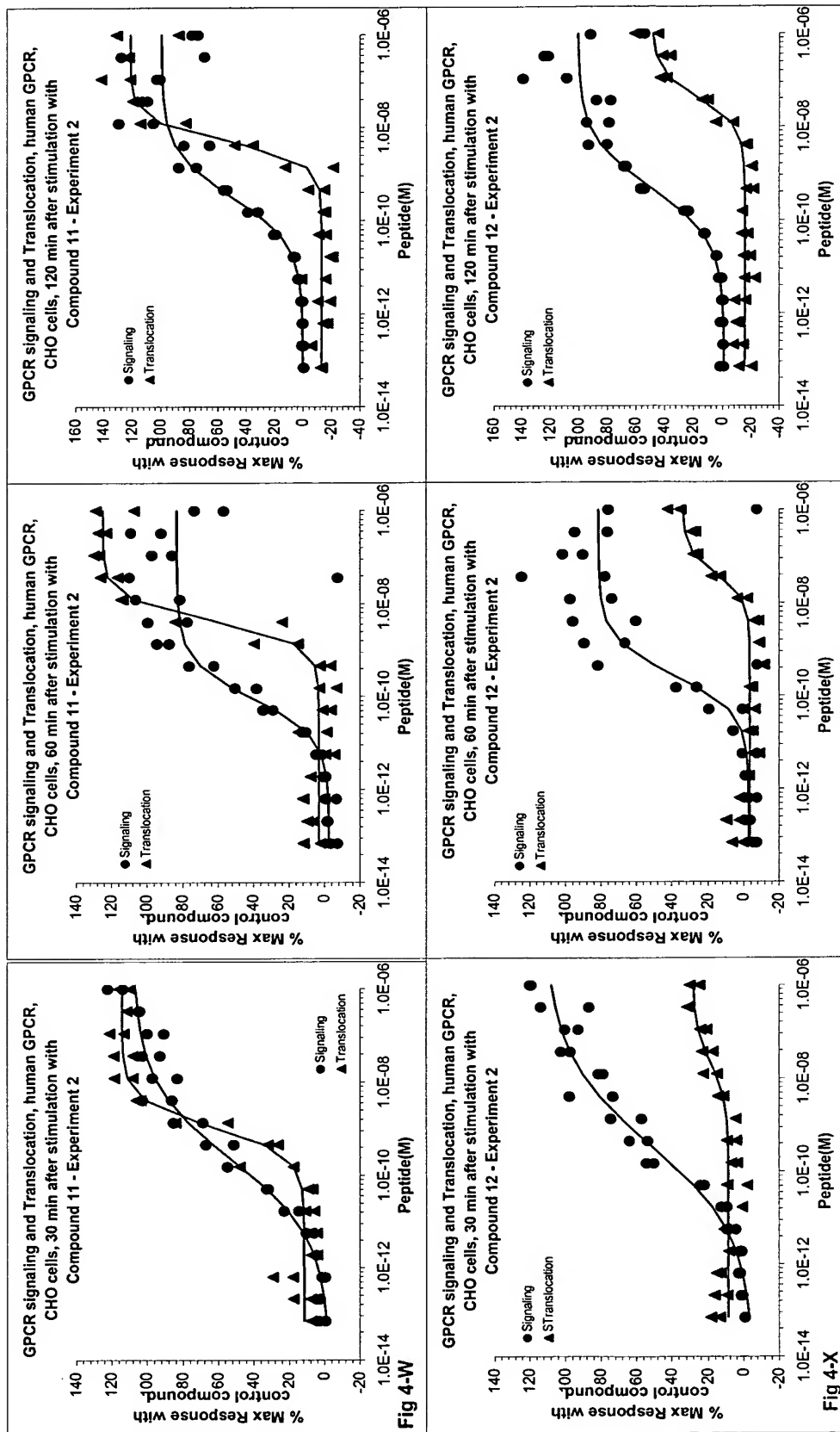


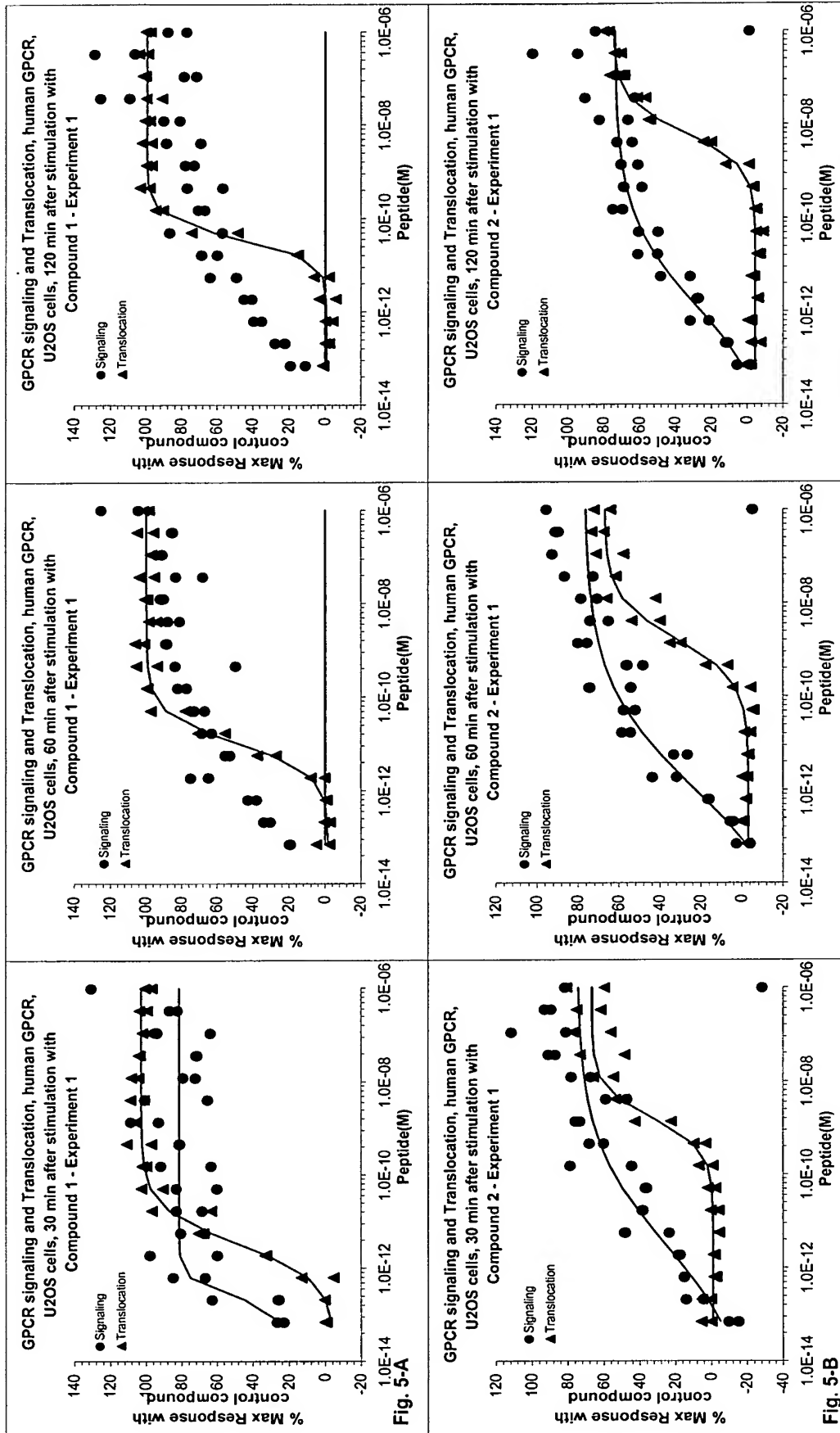


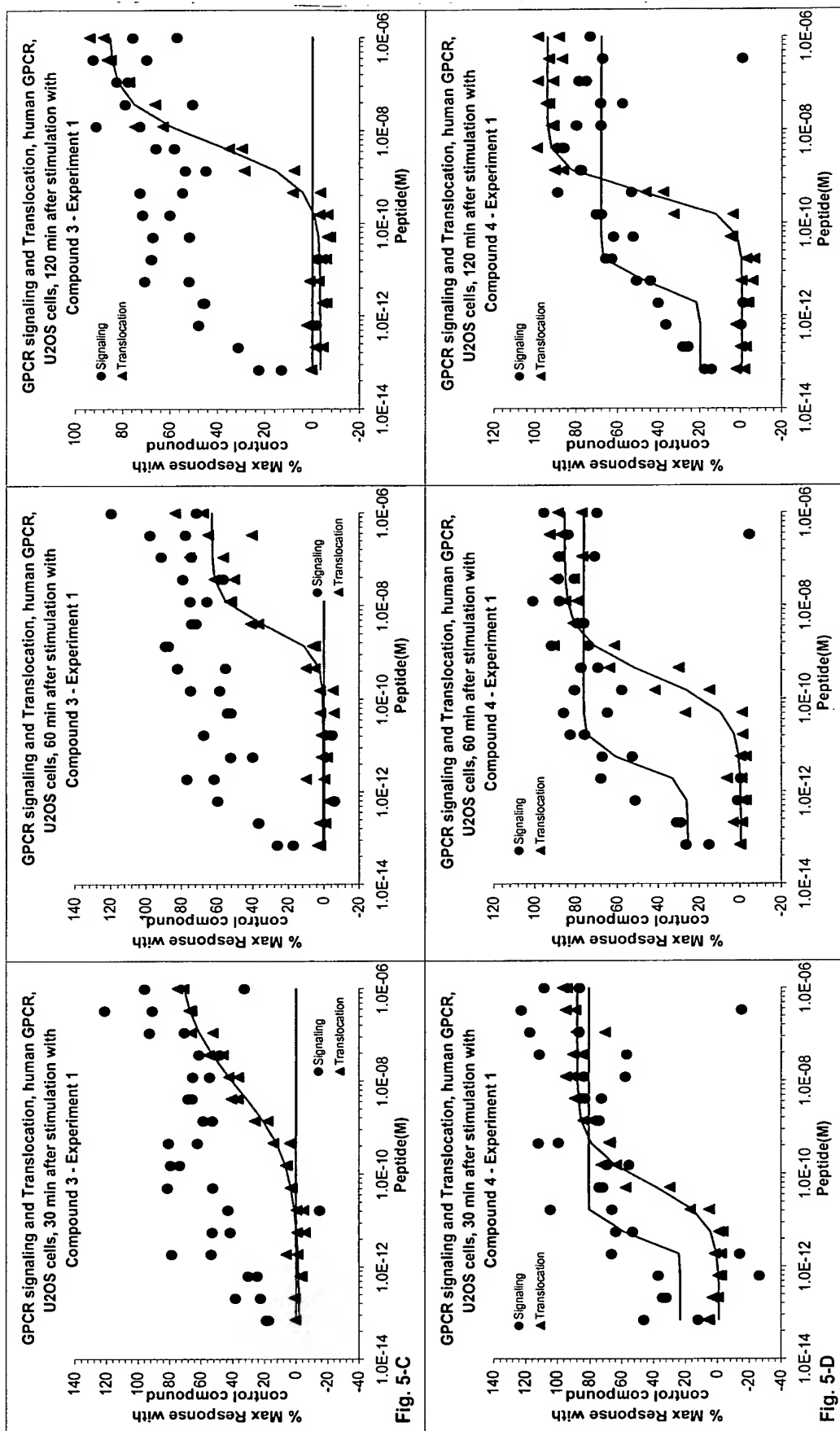


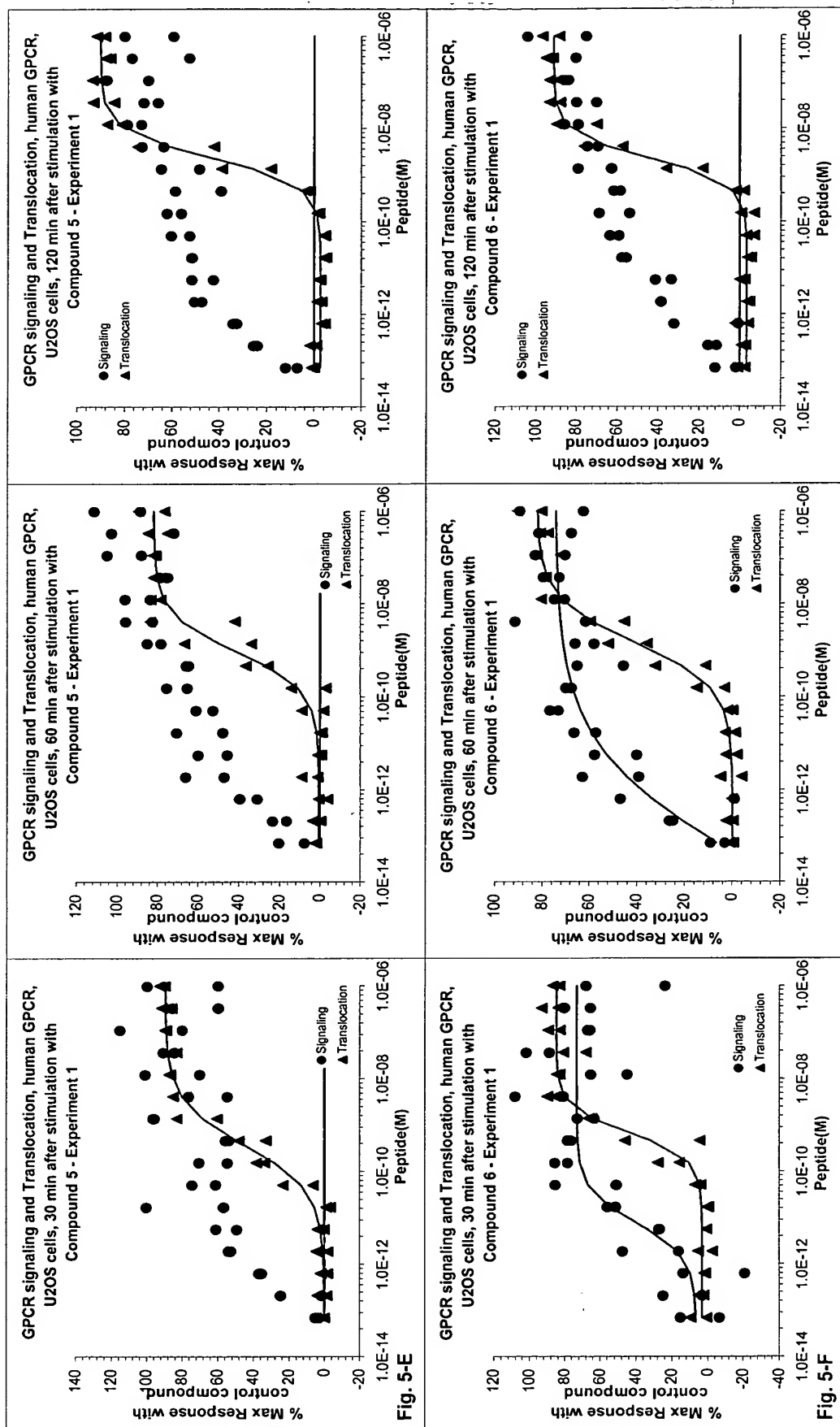


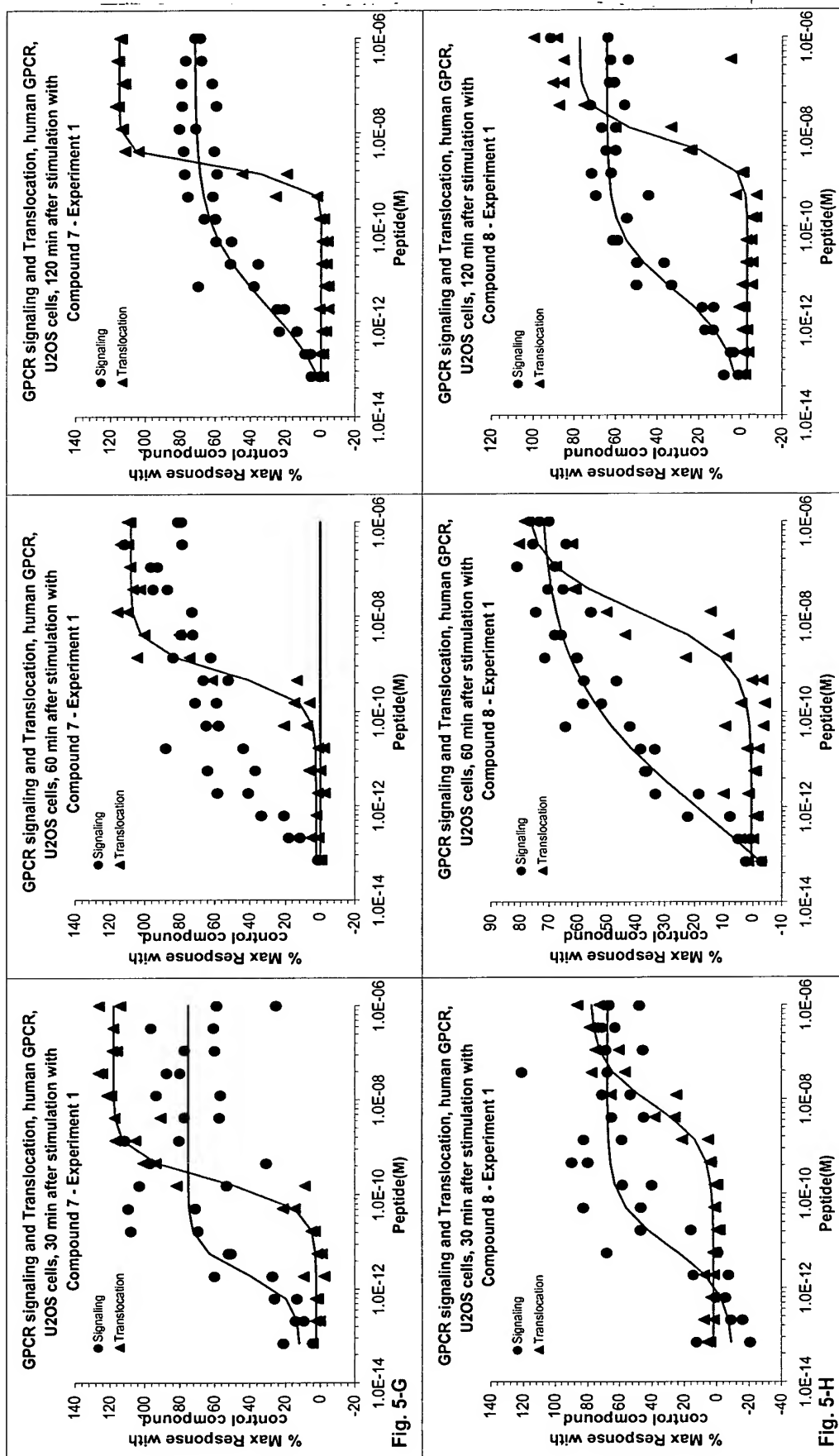


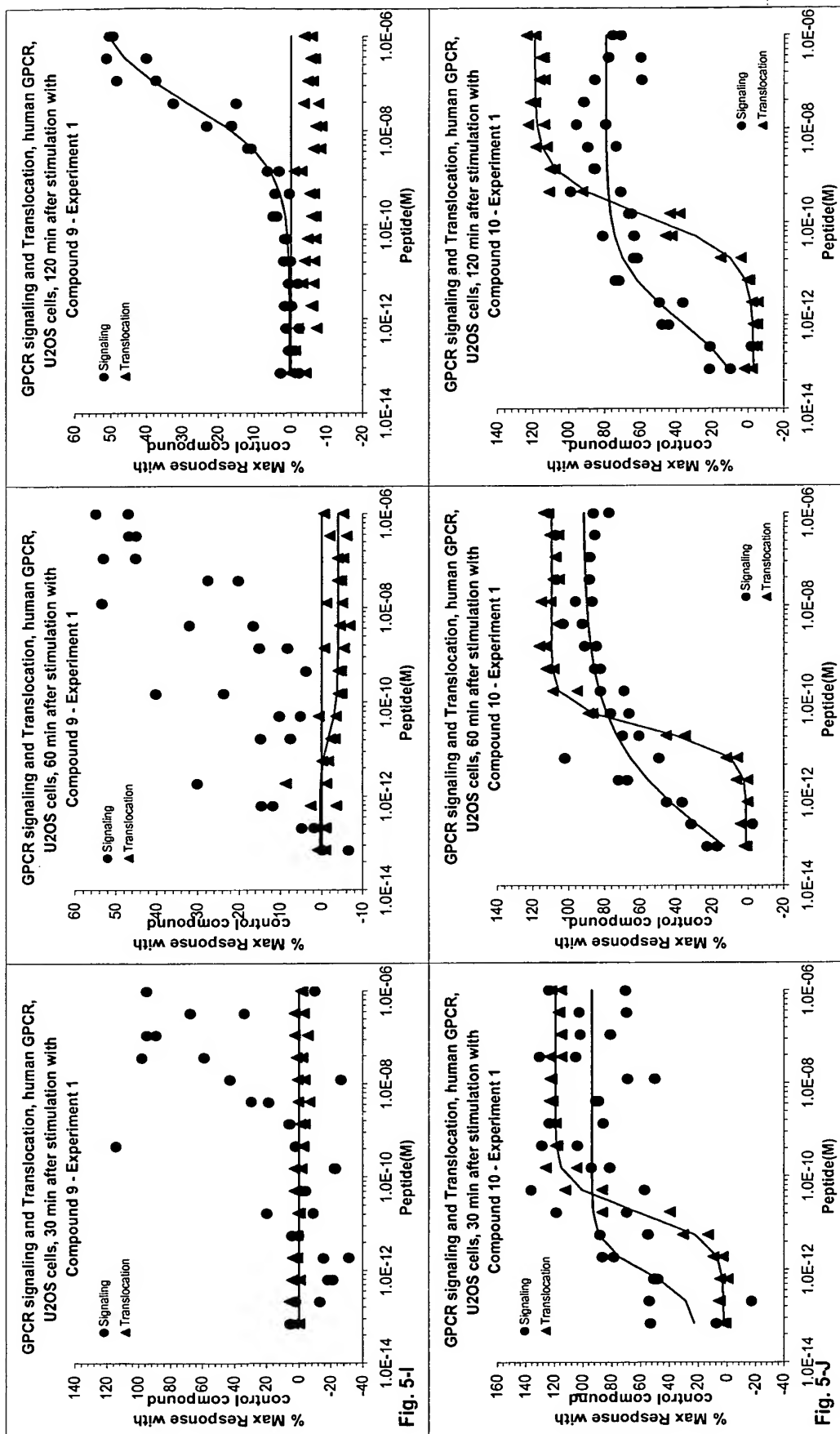


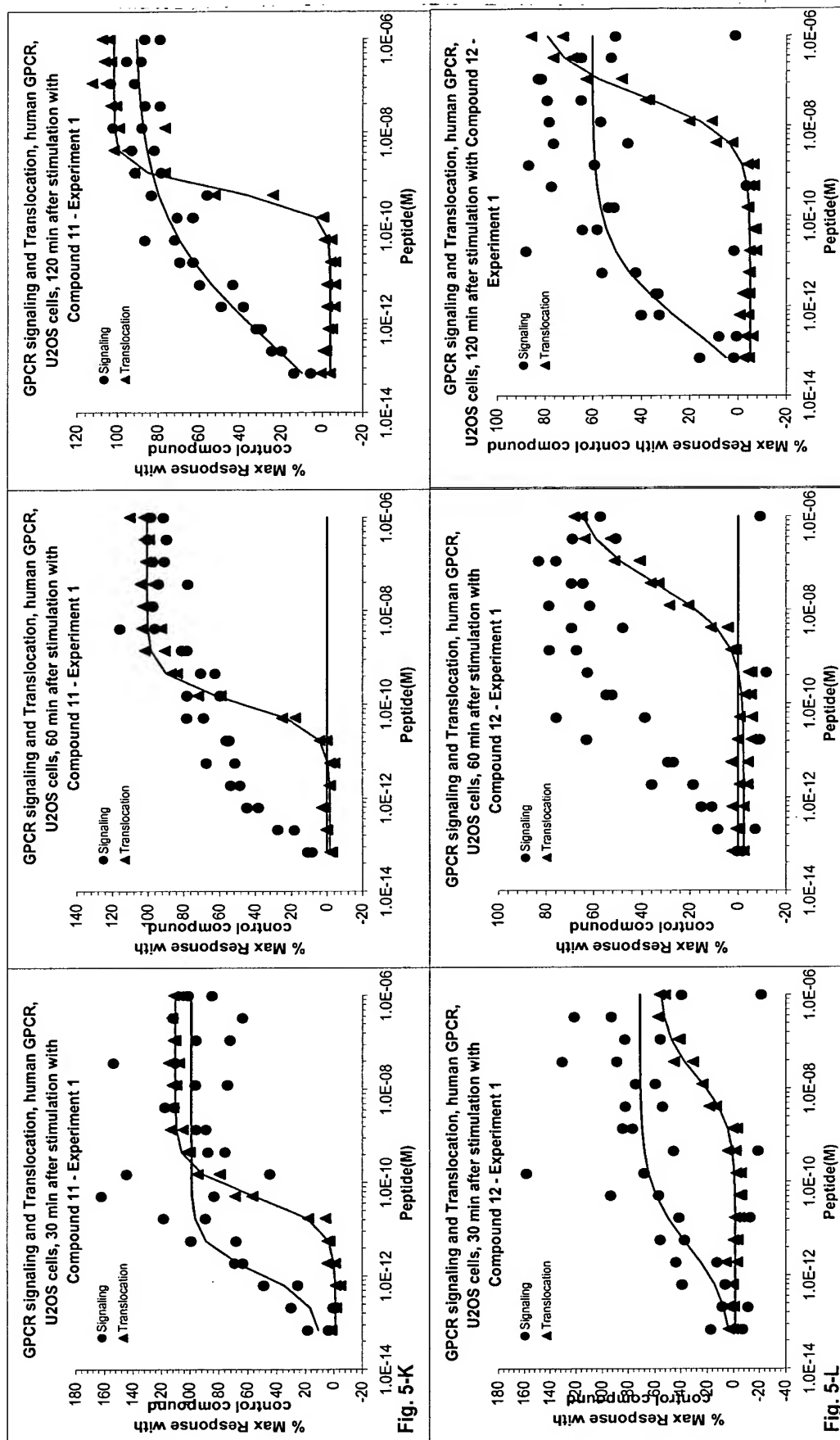


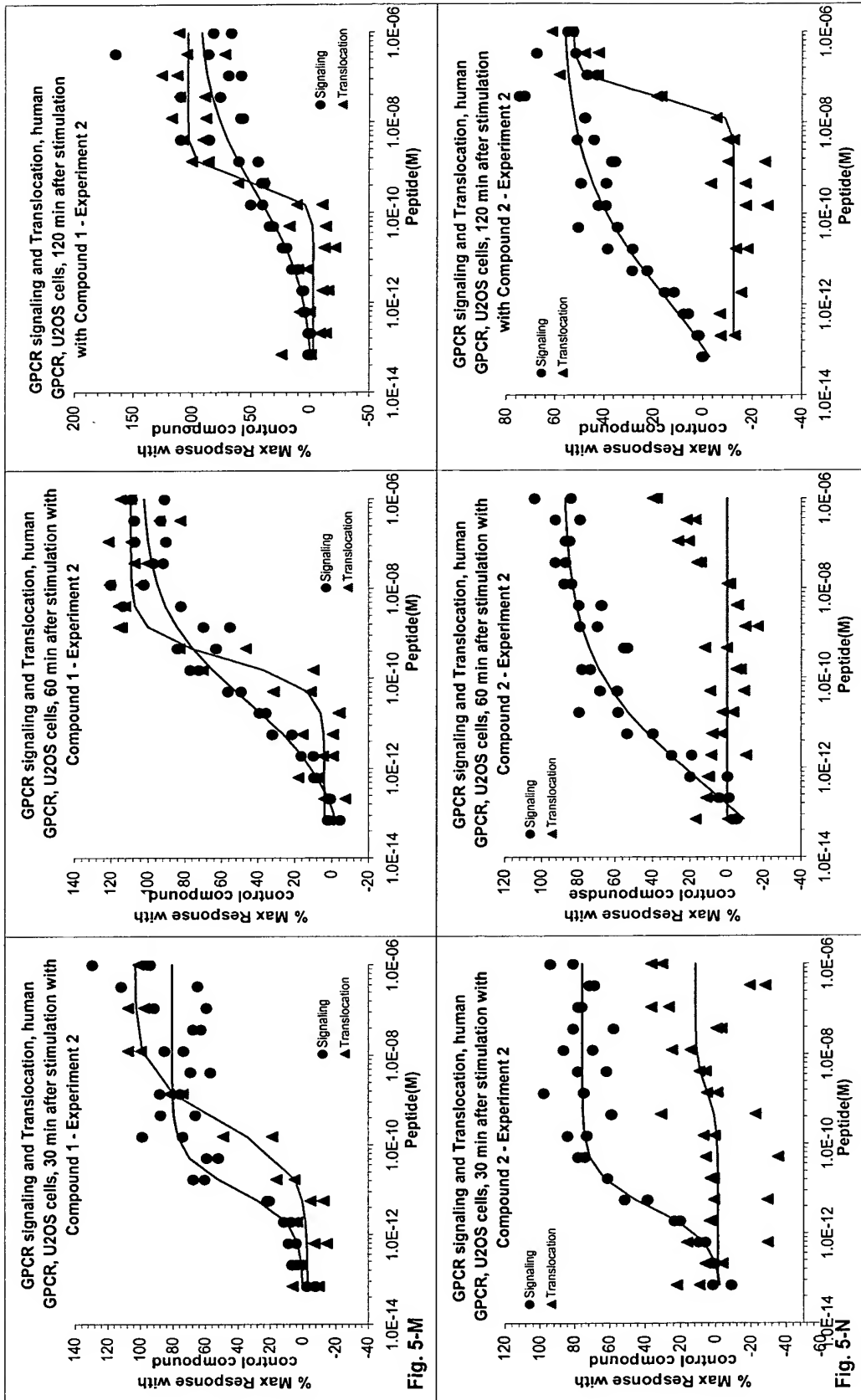


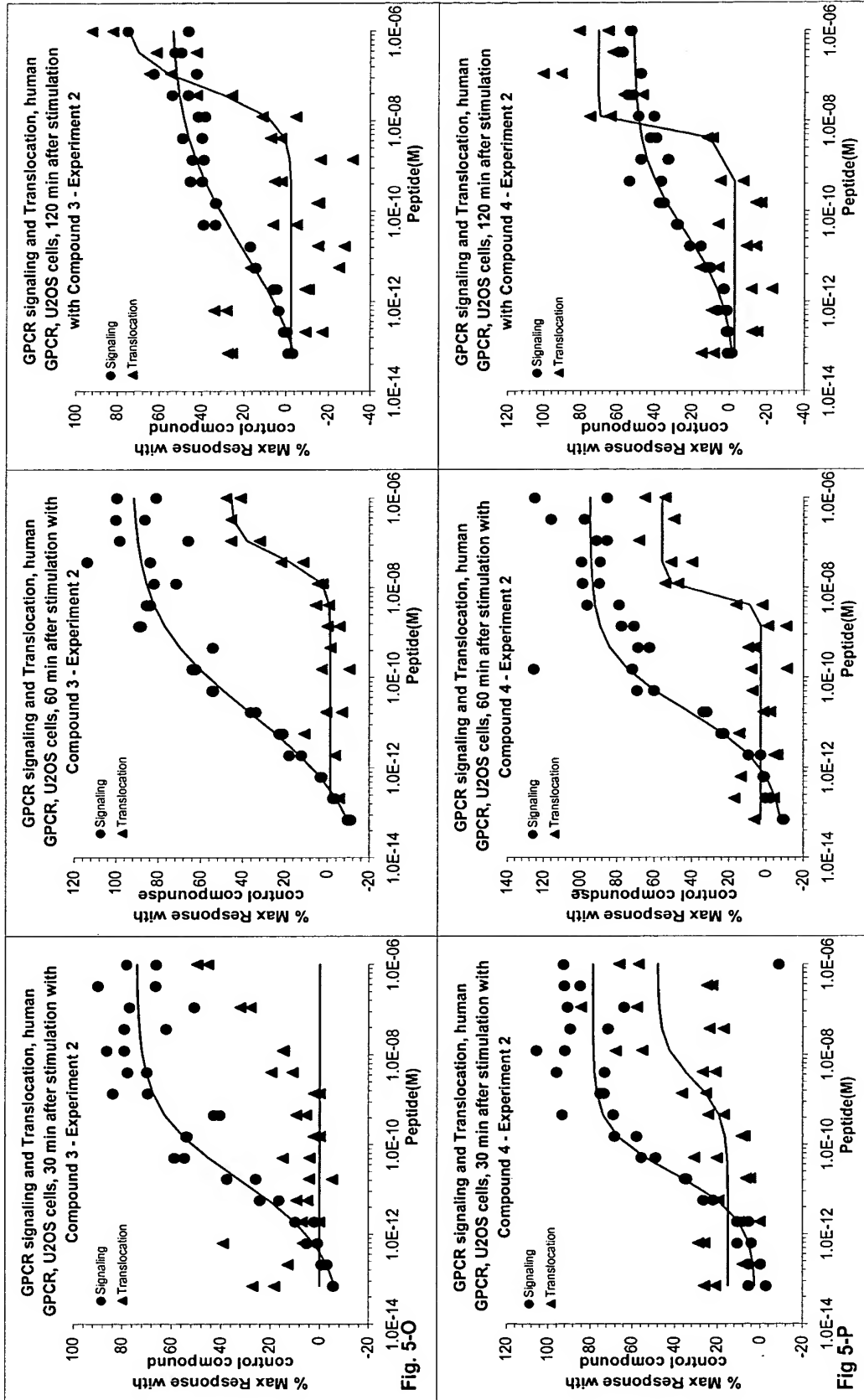


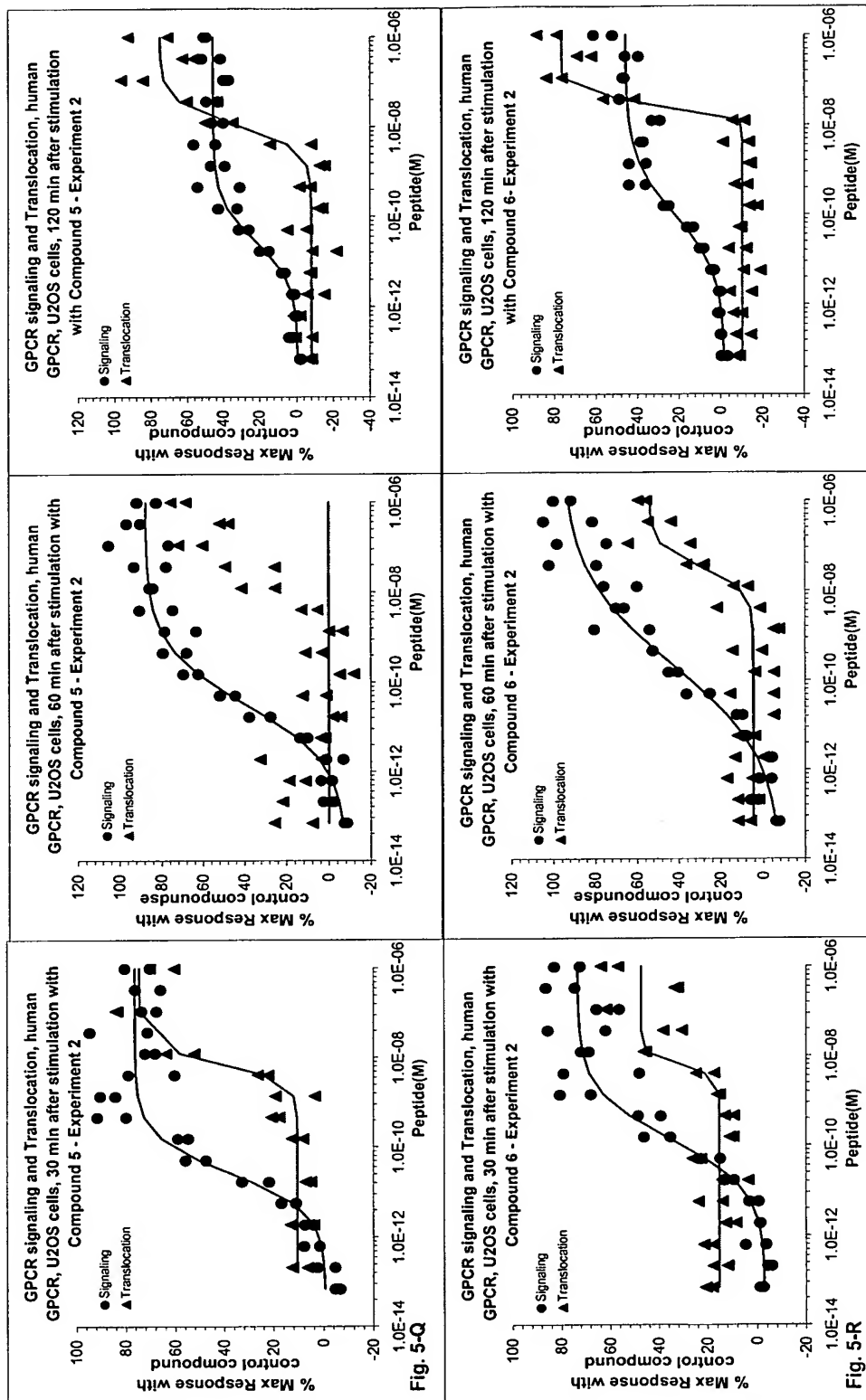


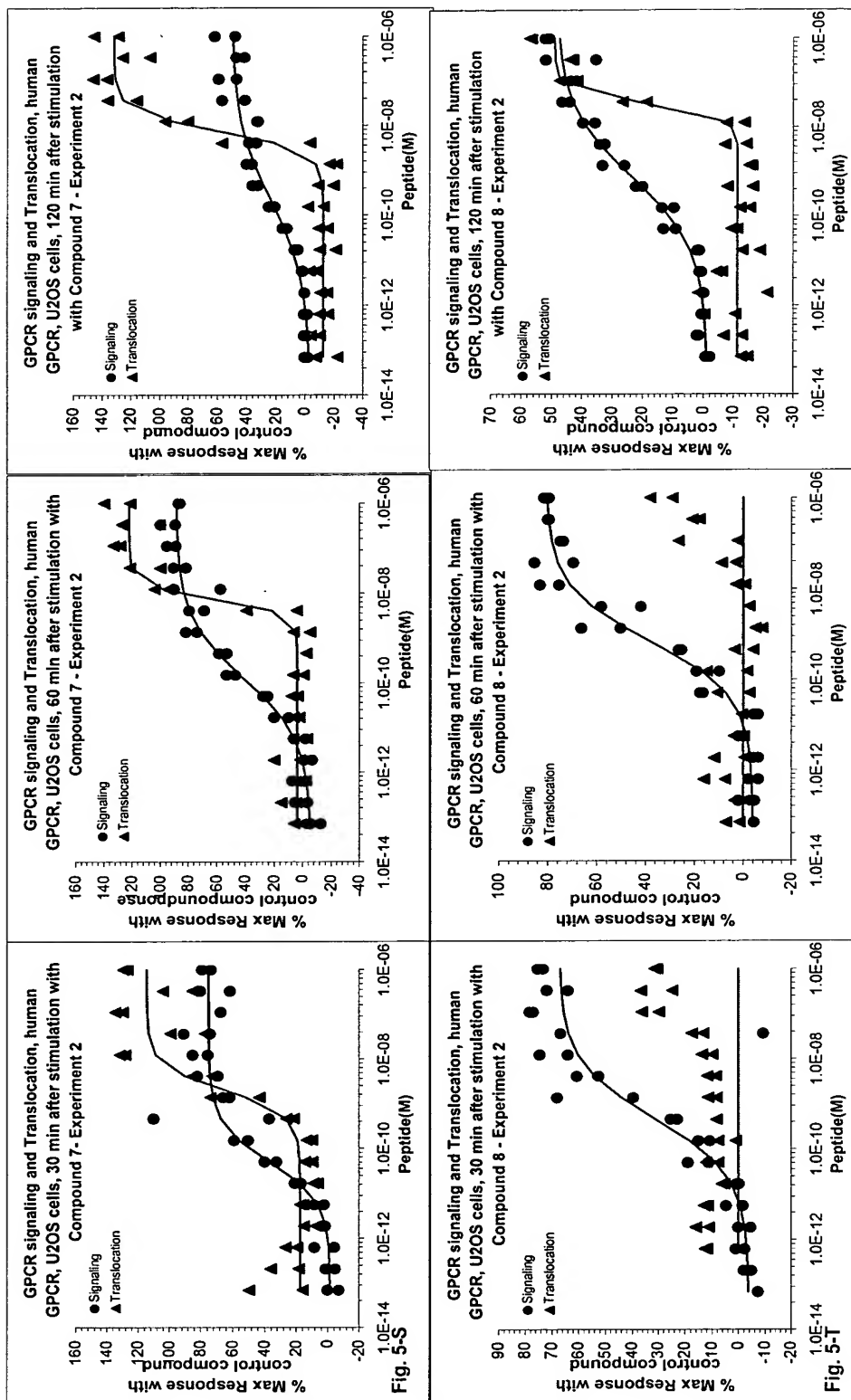


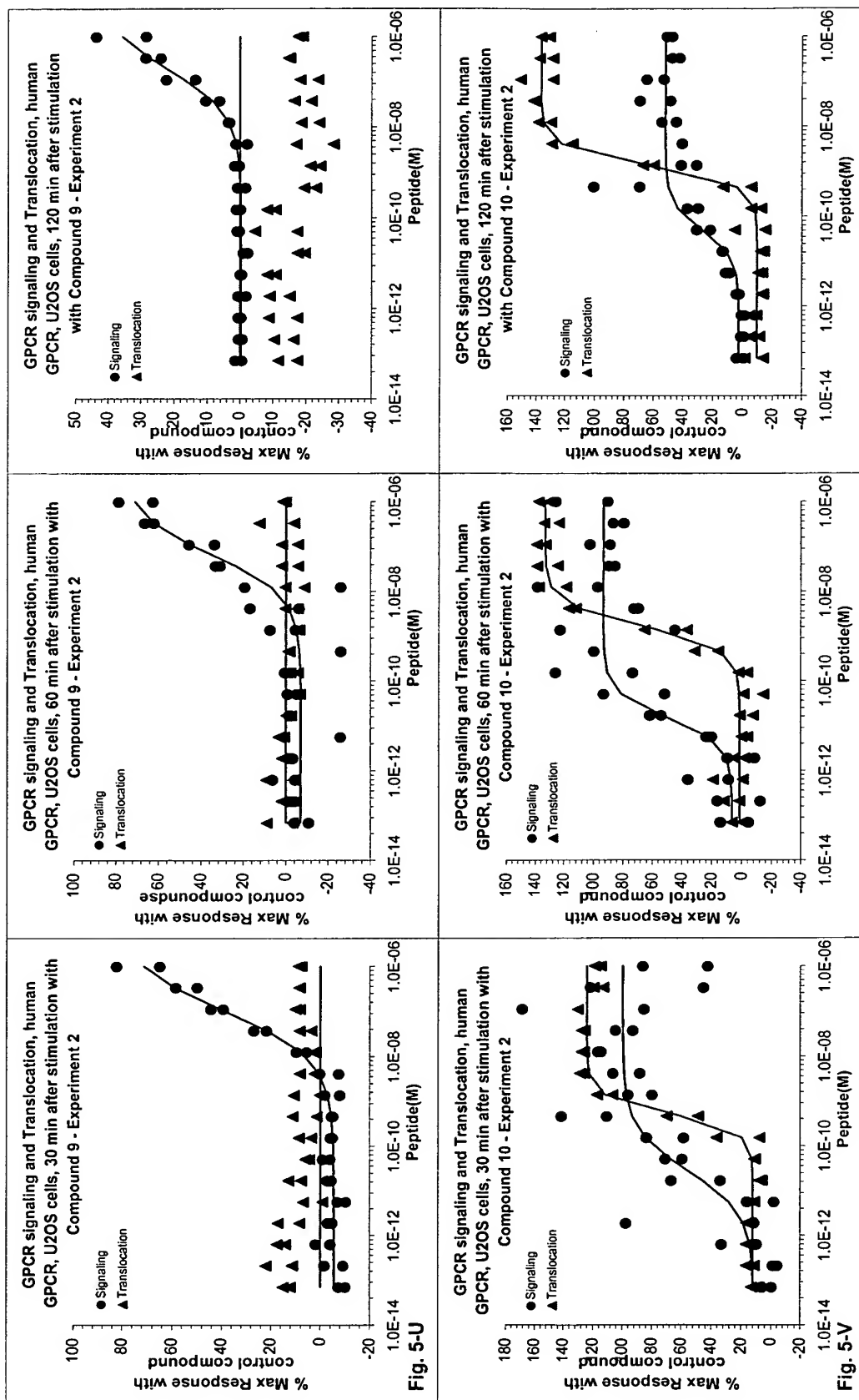


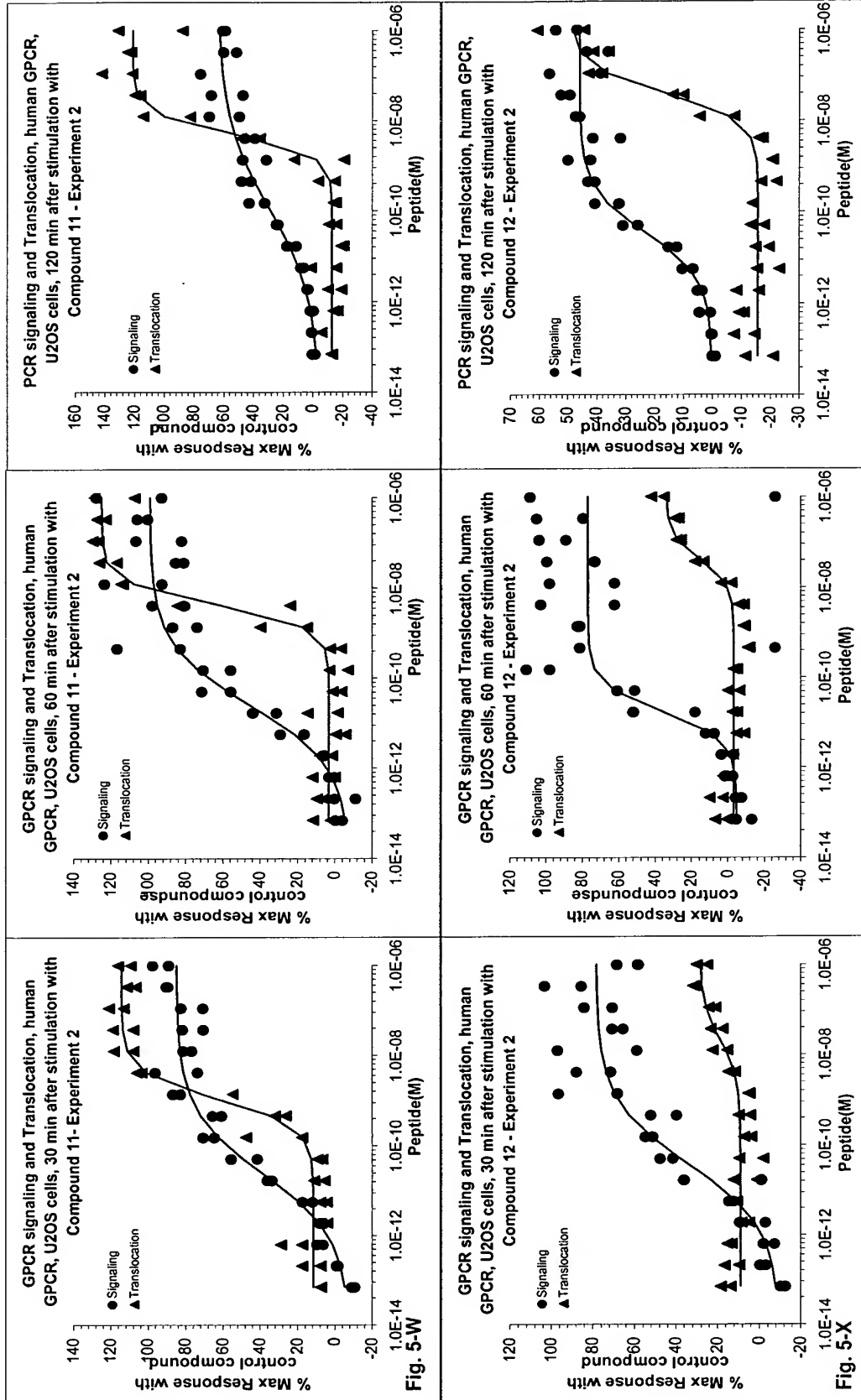


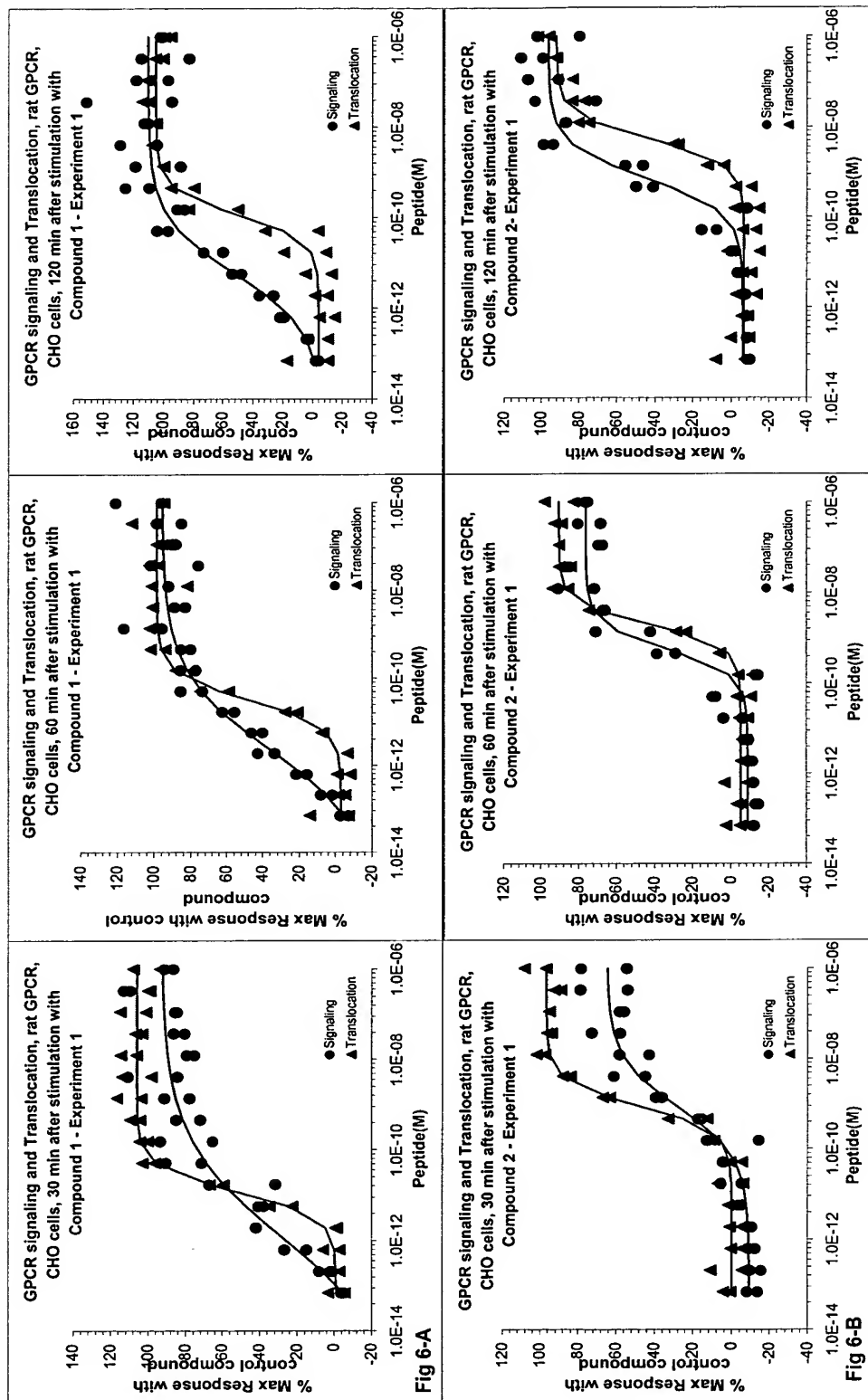


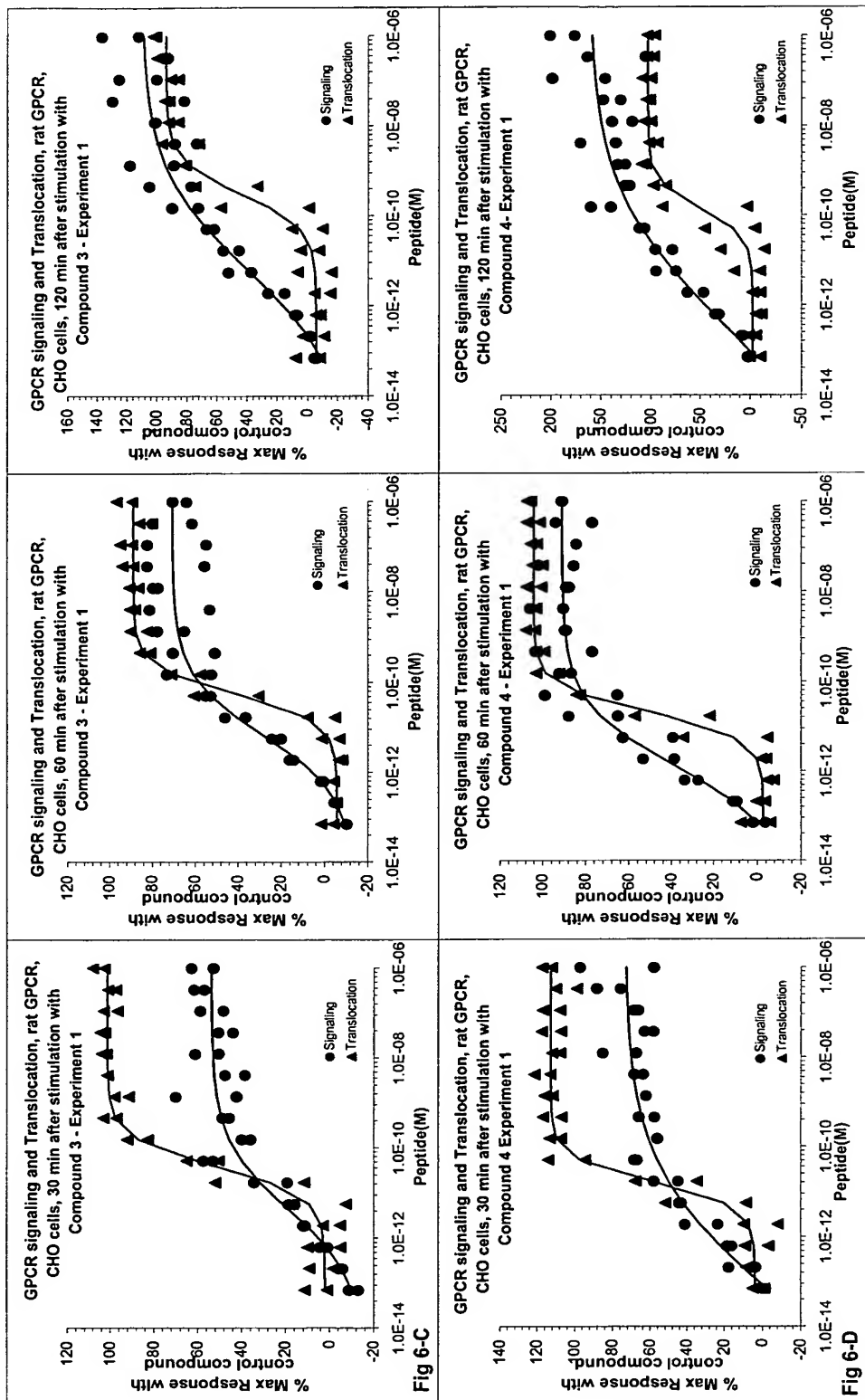


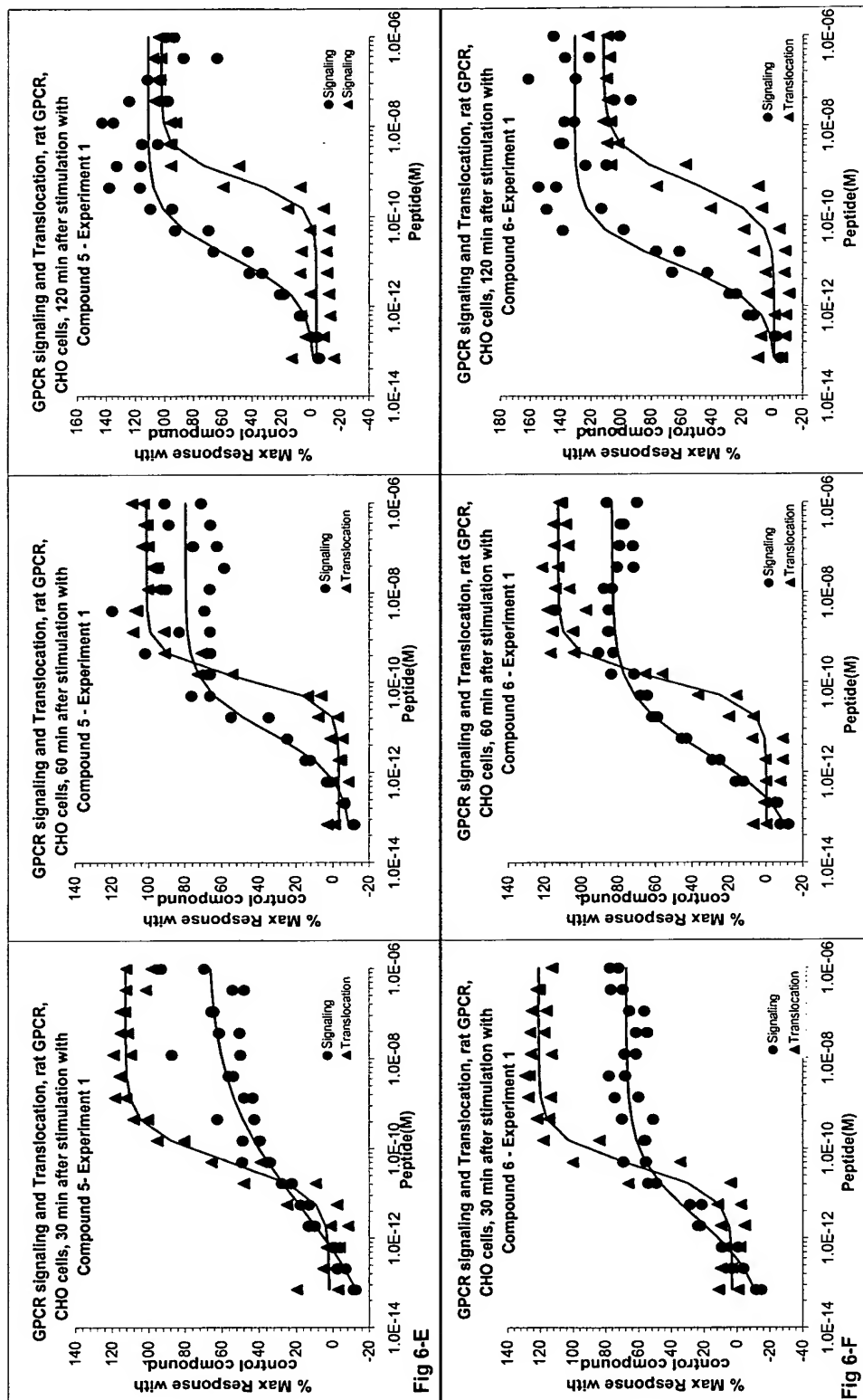


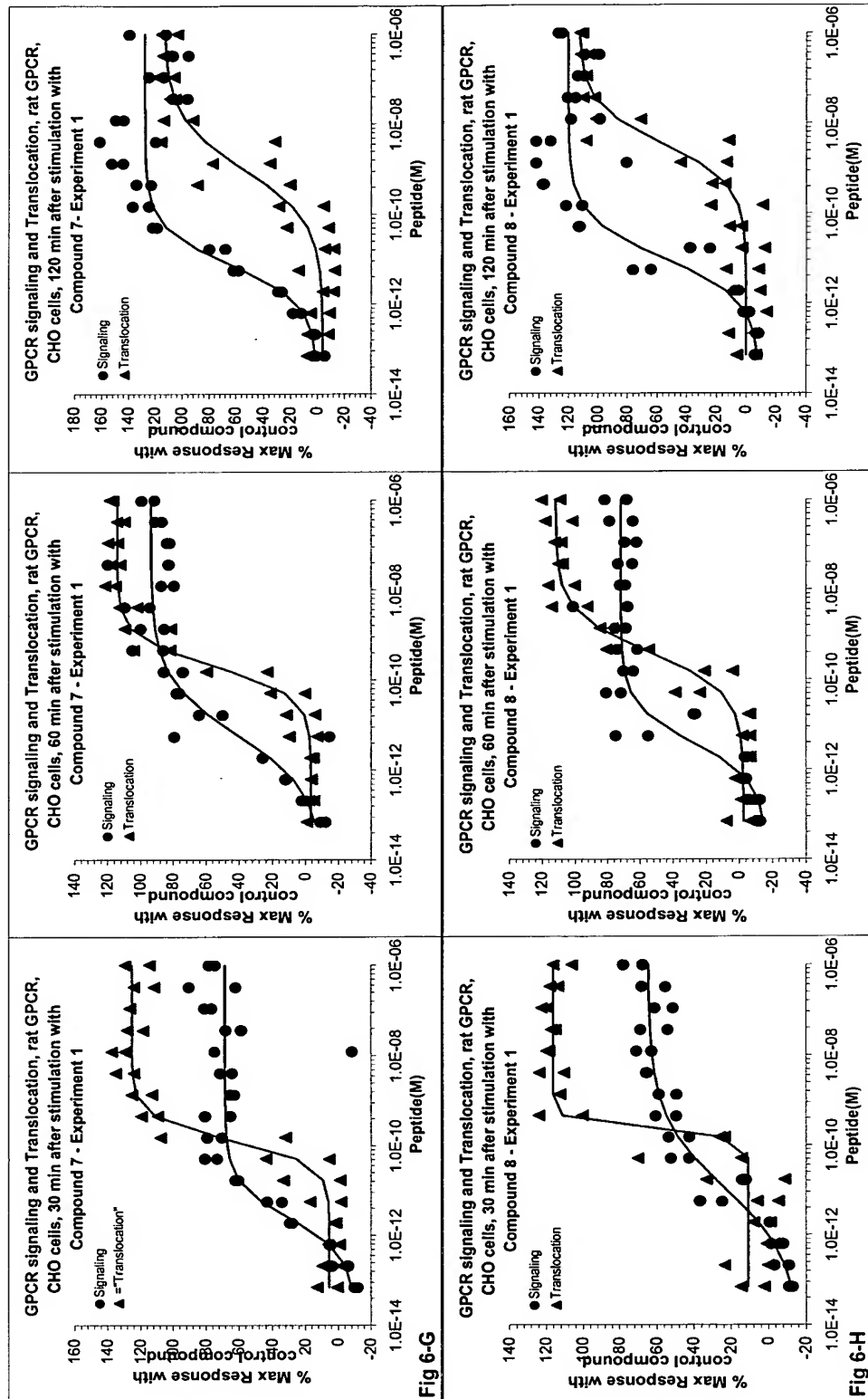


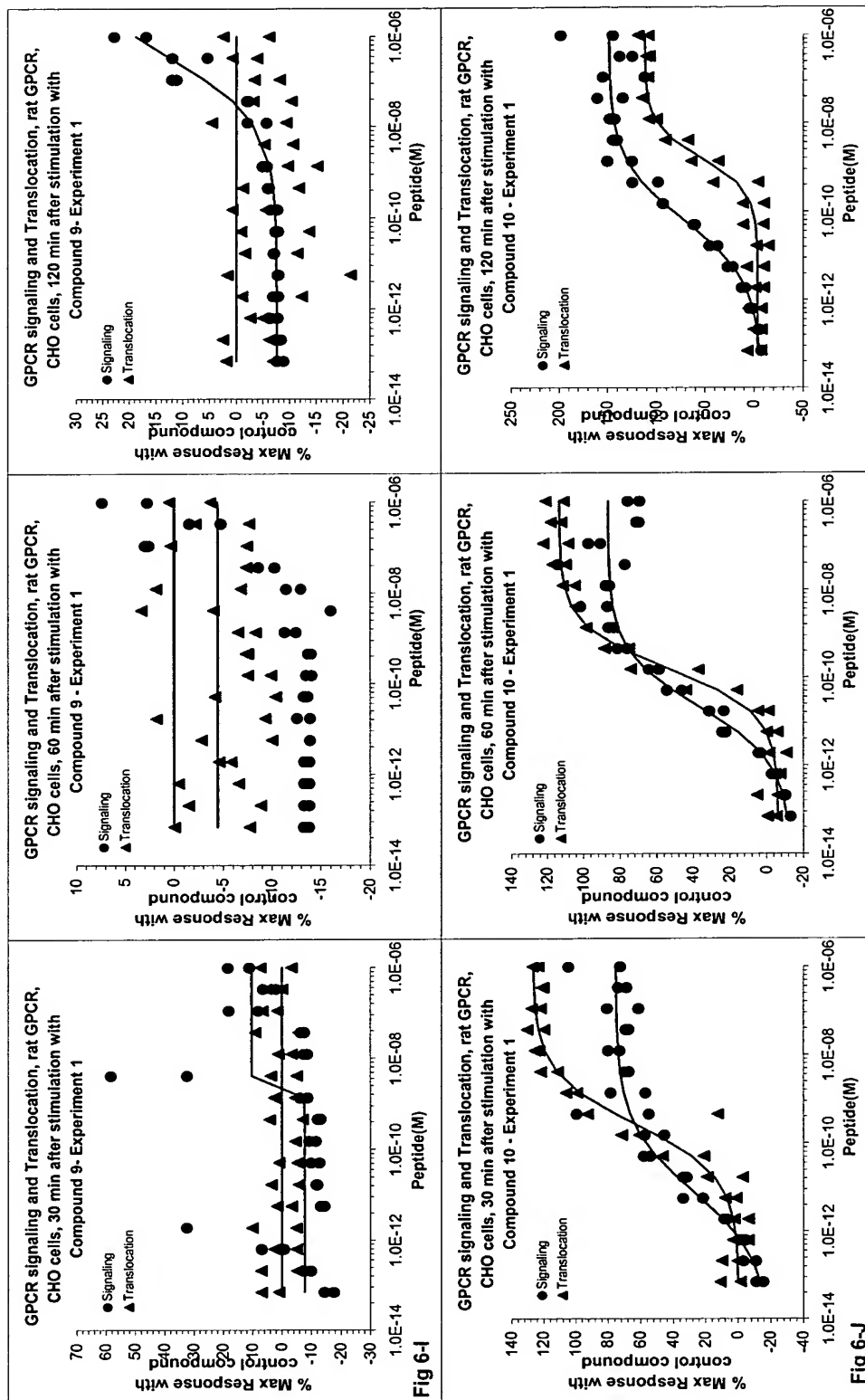












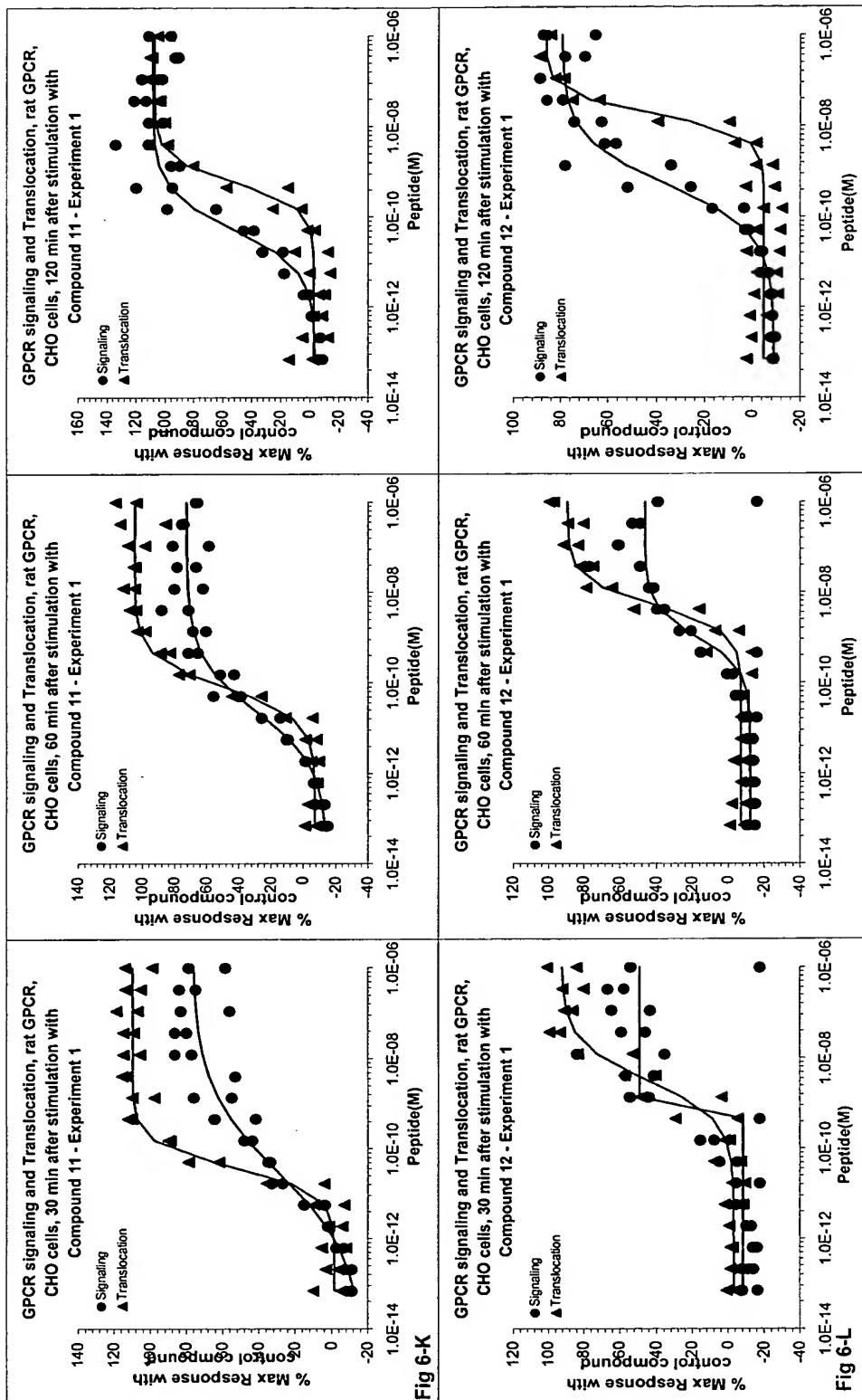
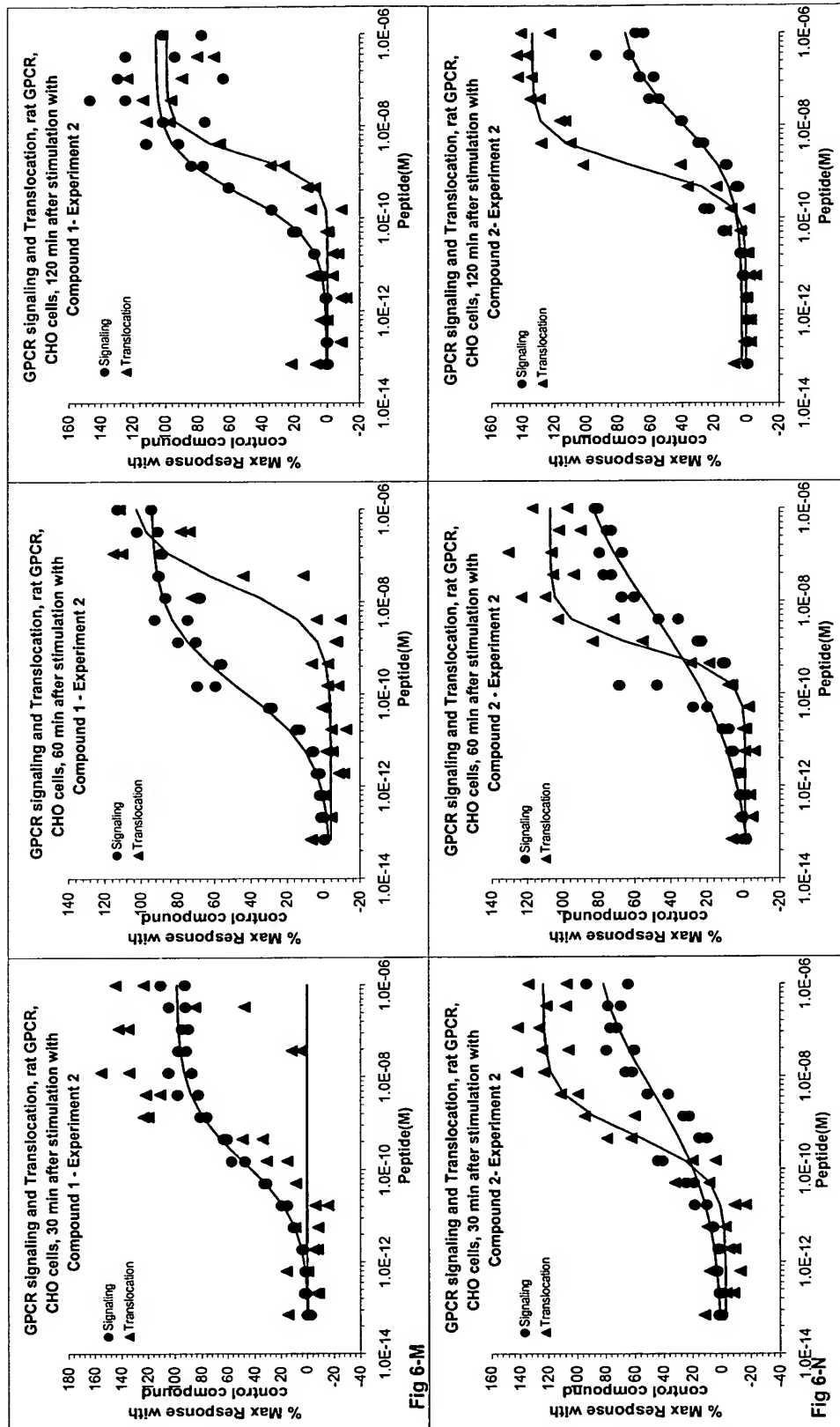
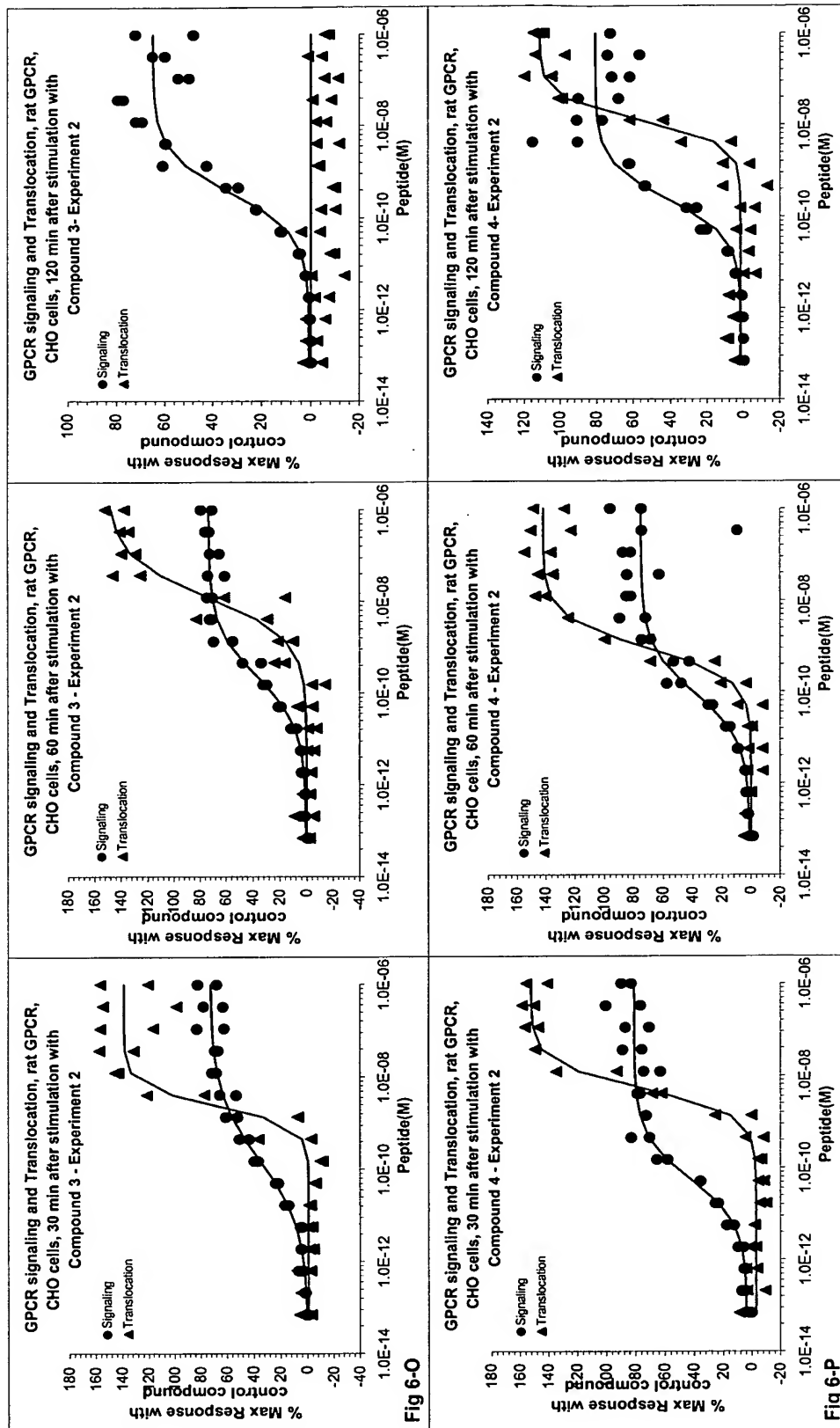
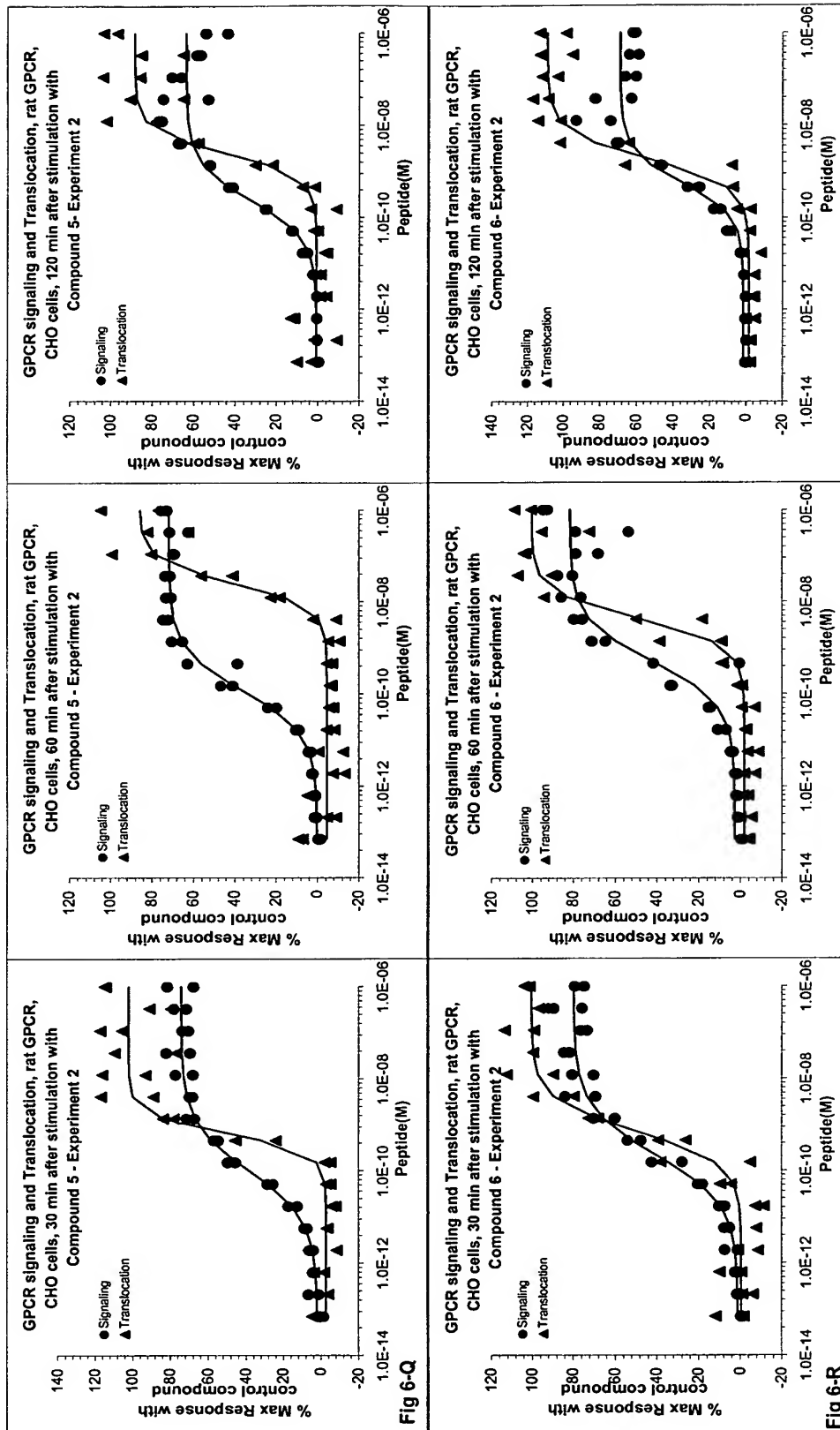
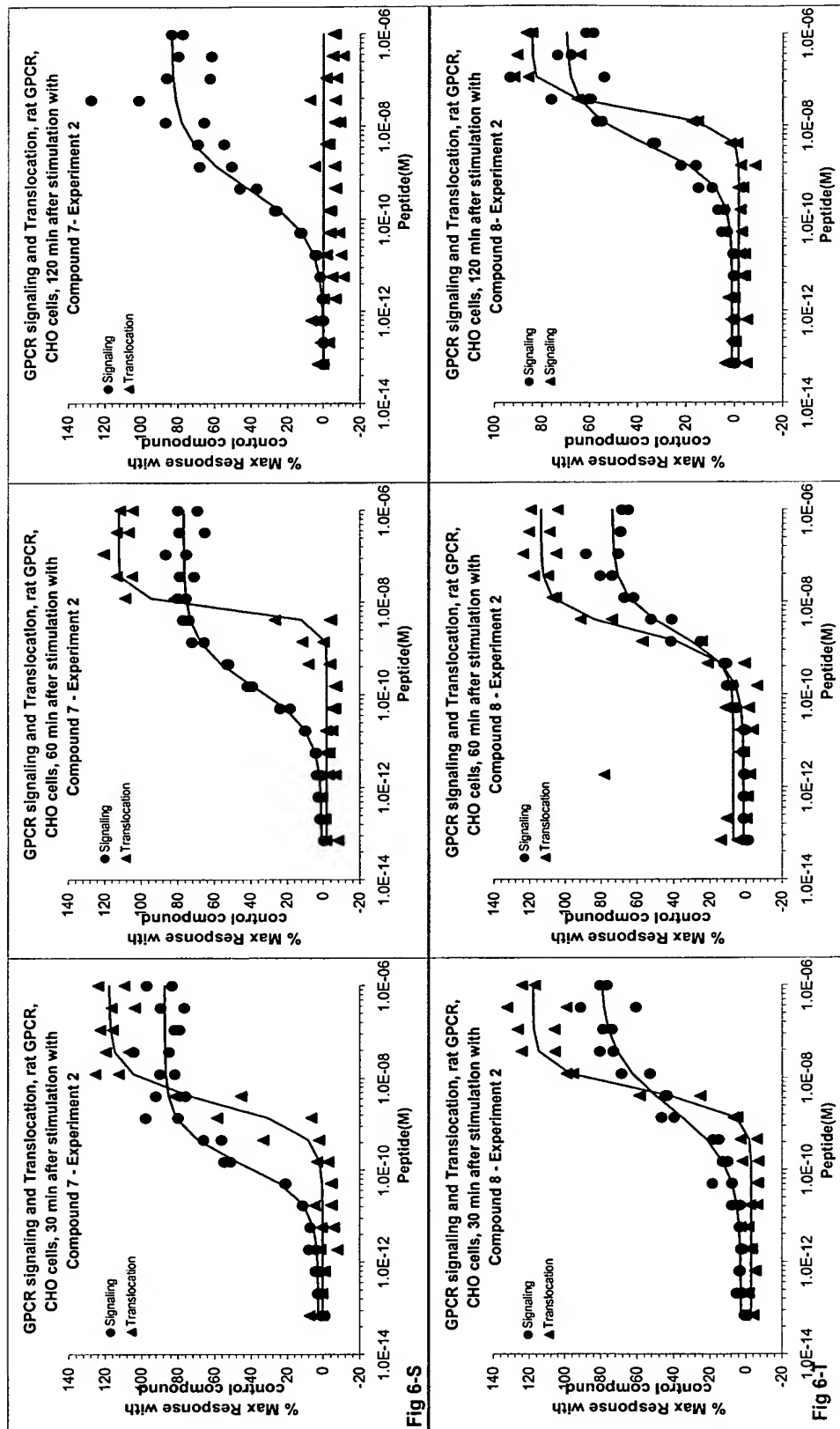


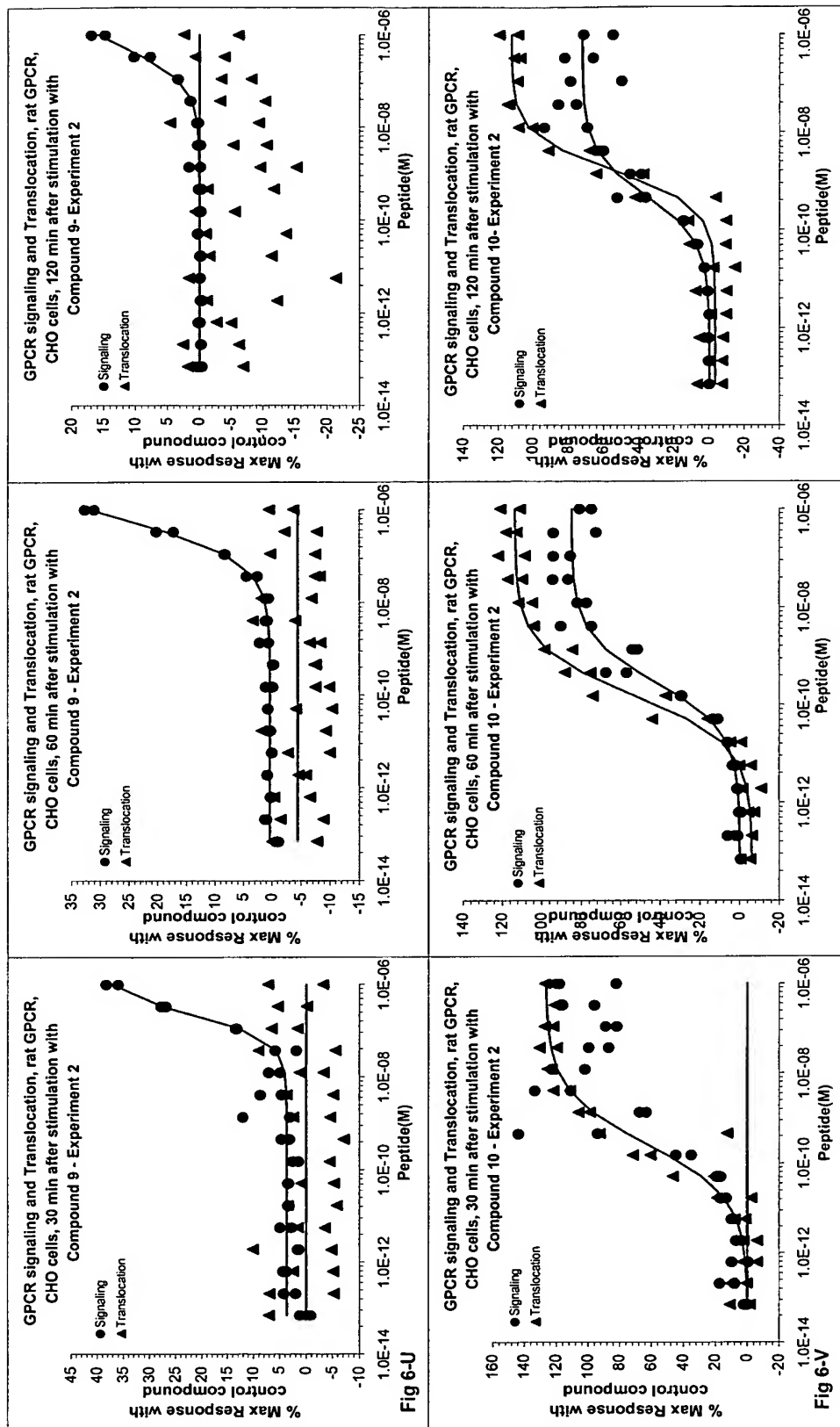
Fig 6-L

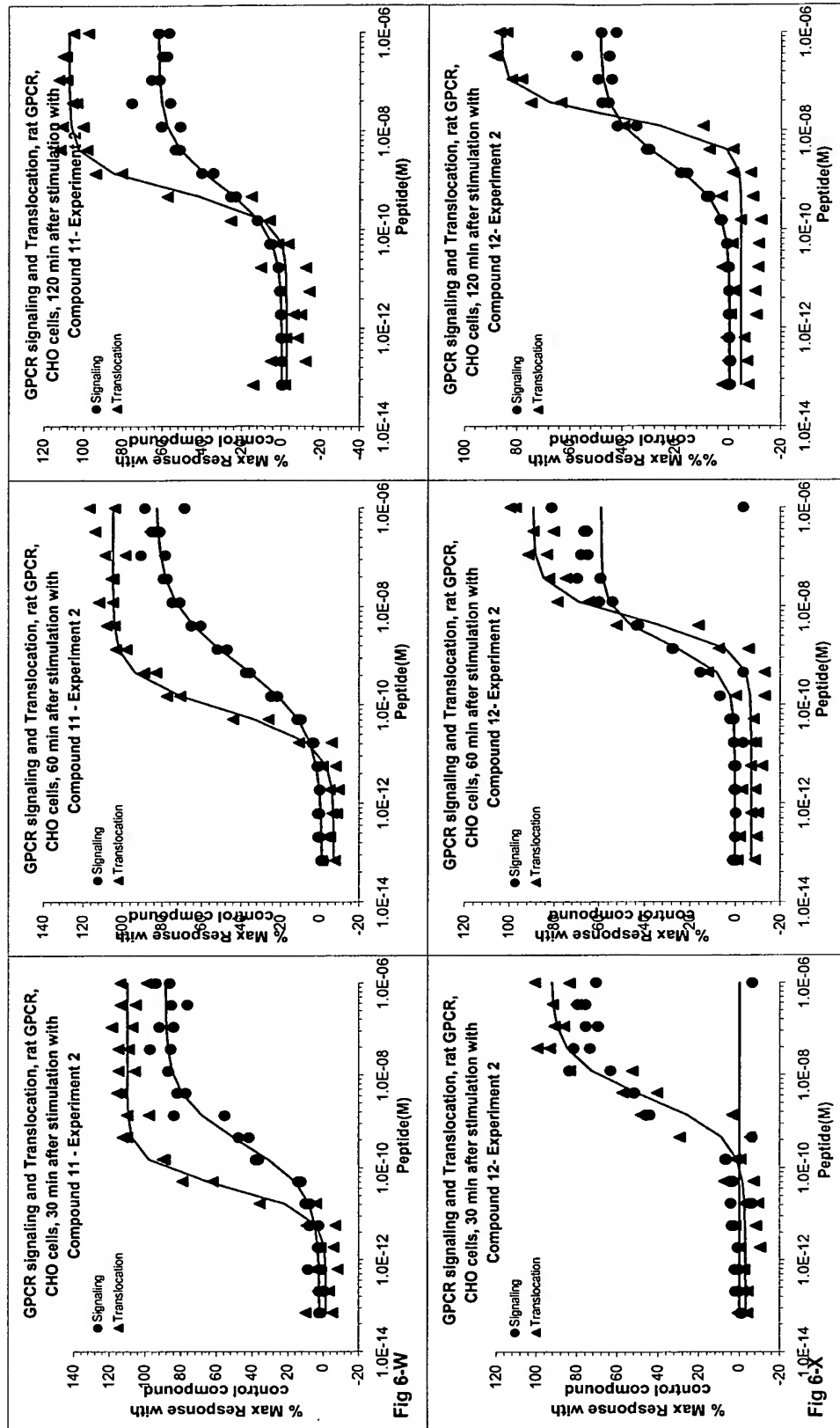


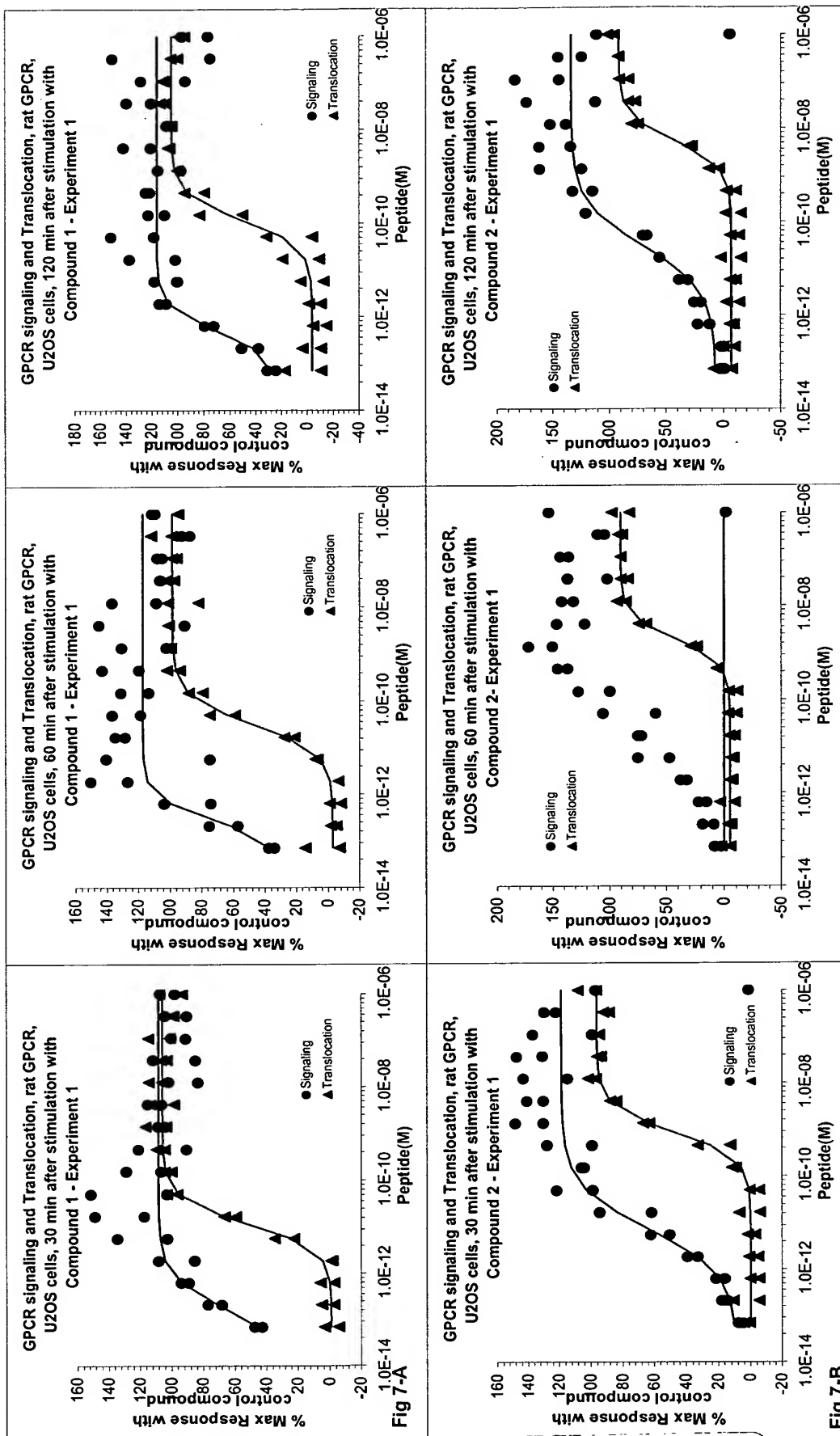


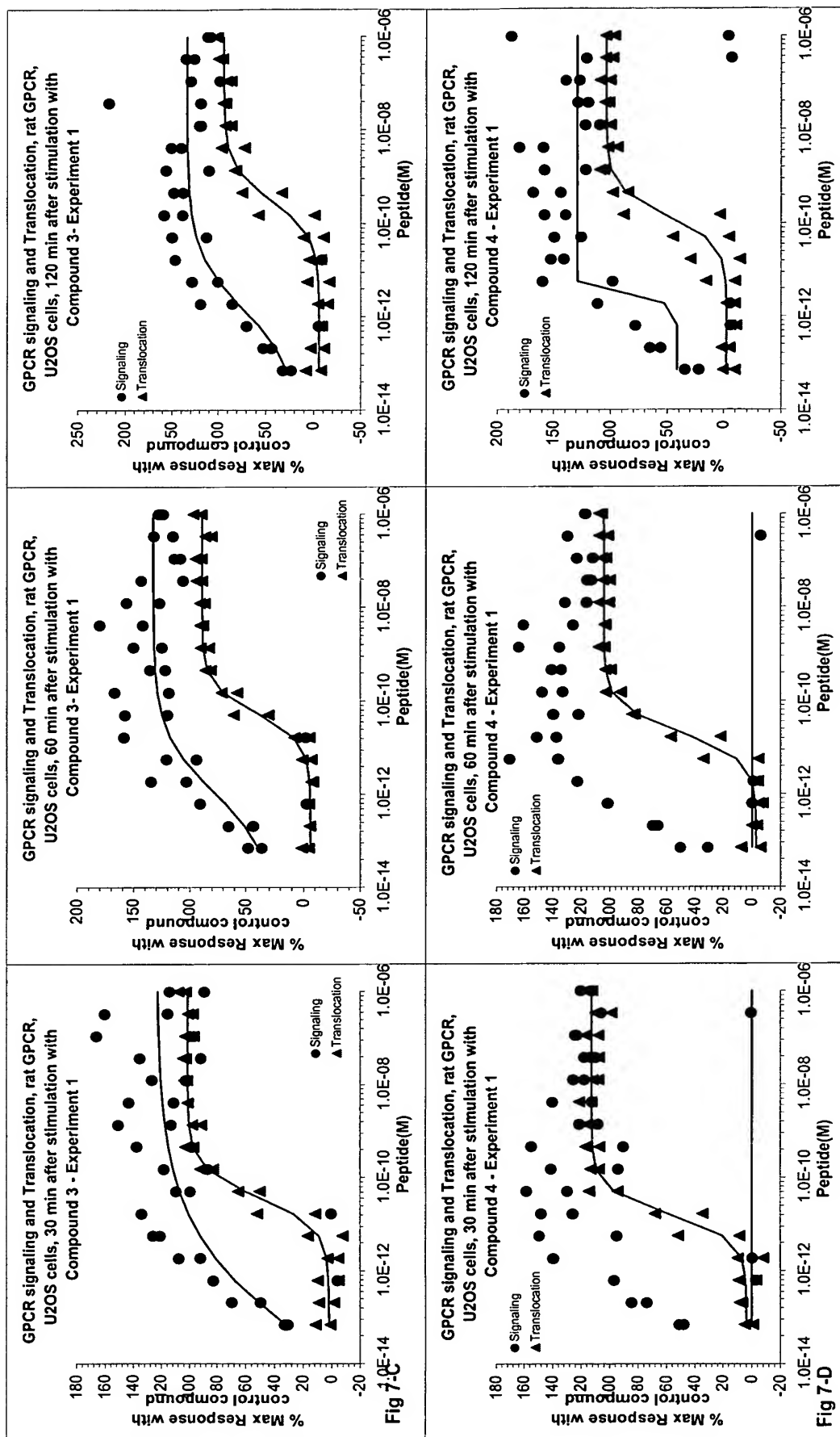


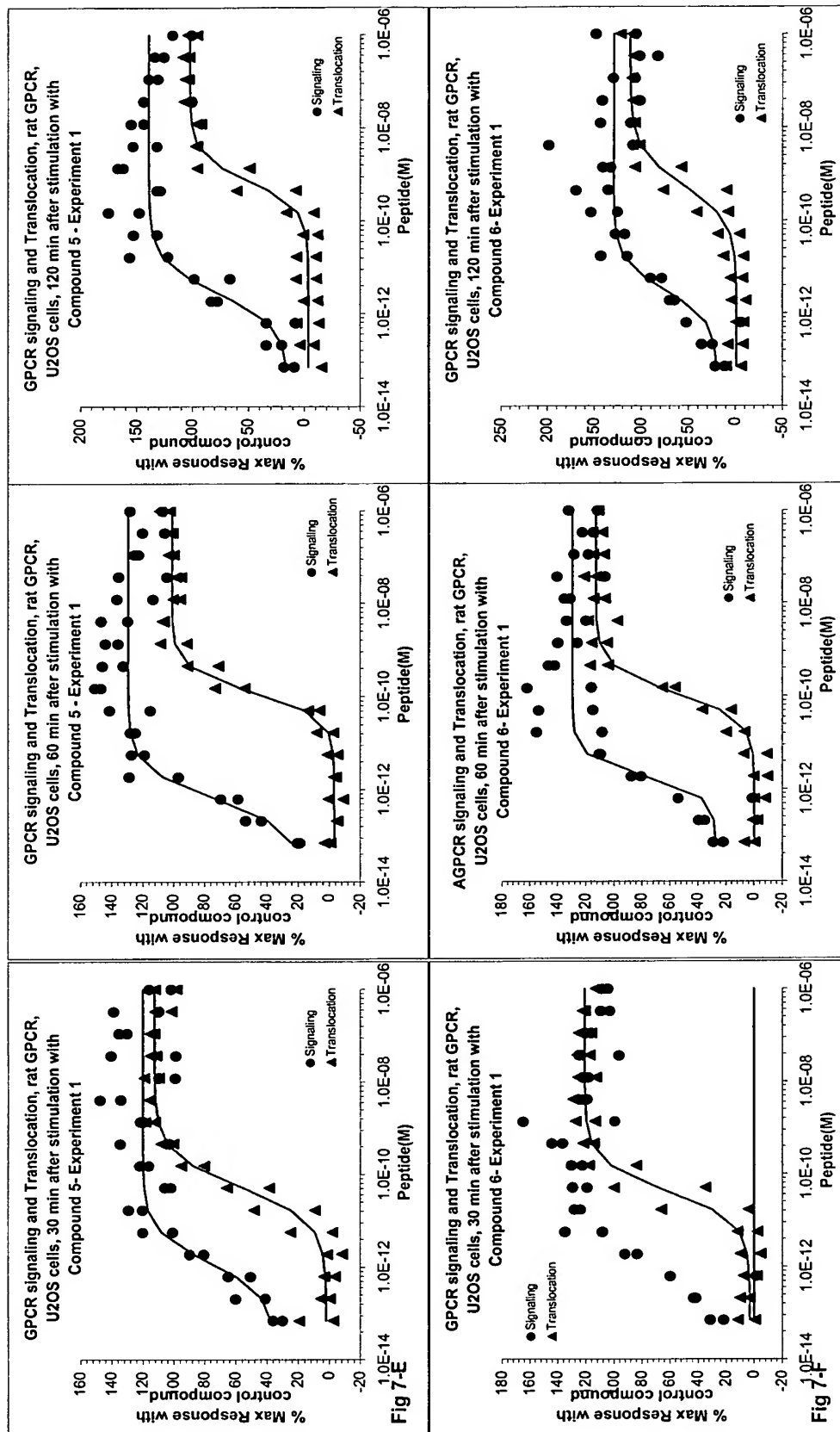


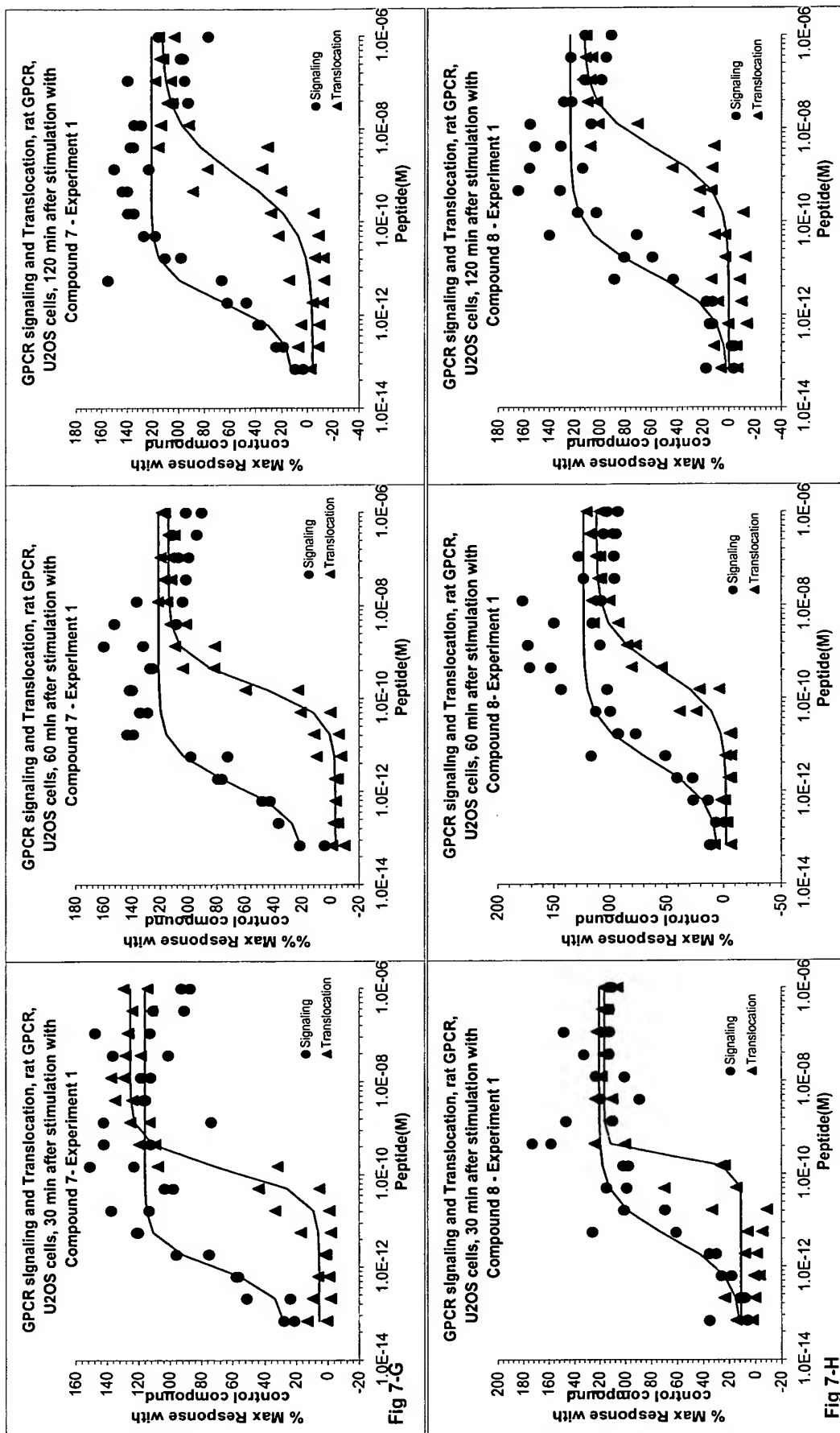


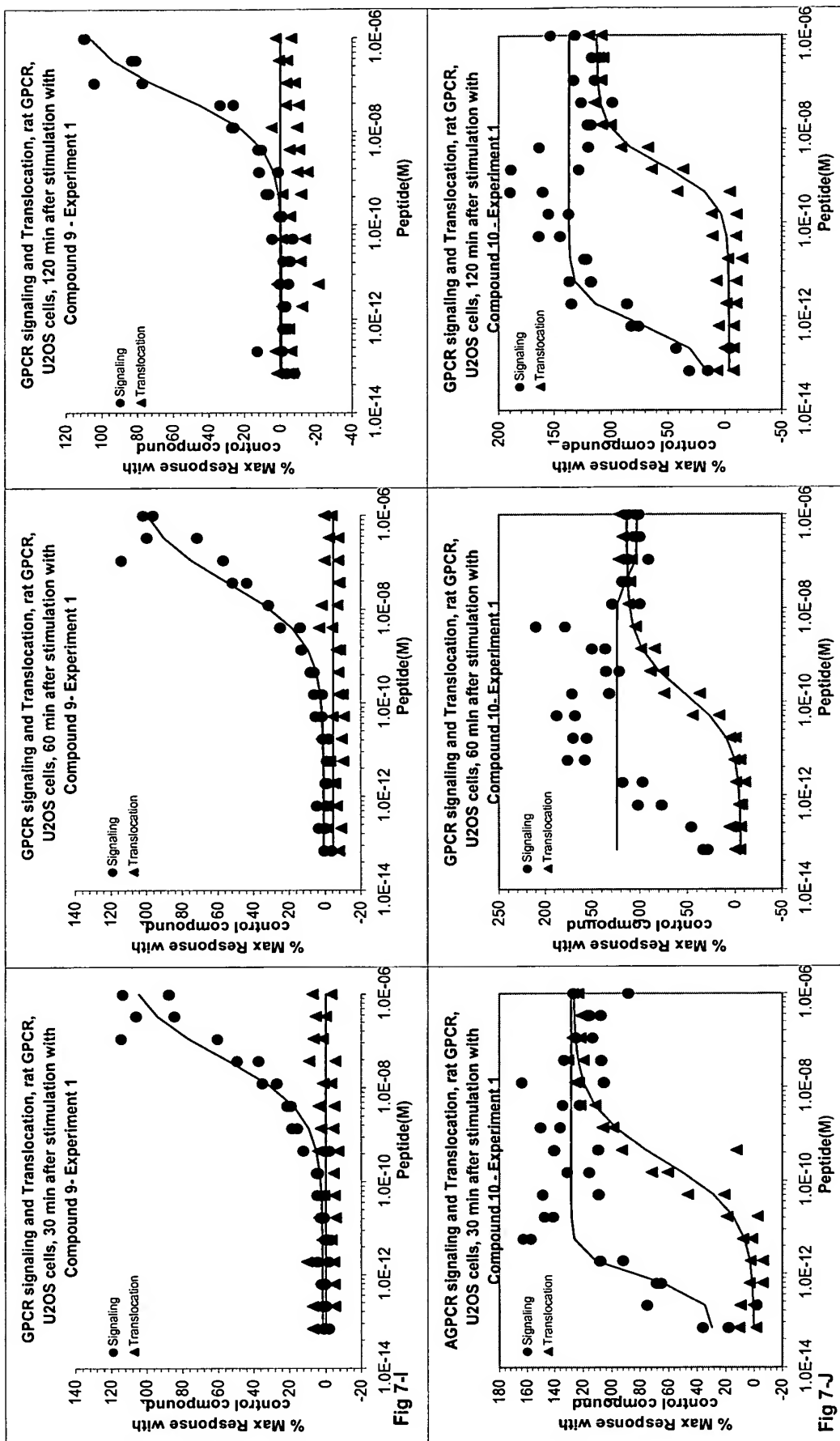


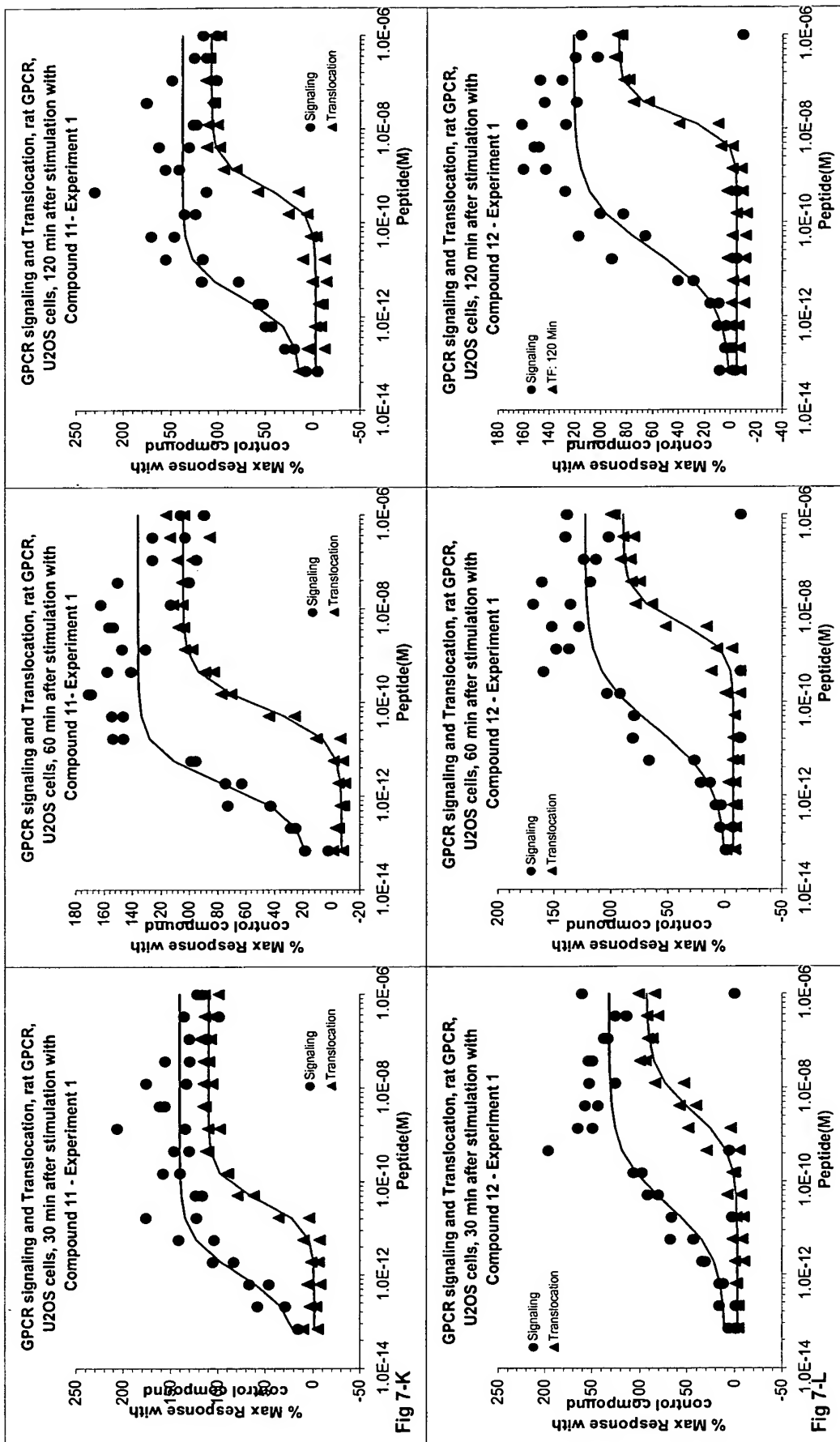


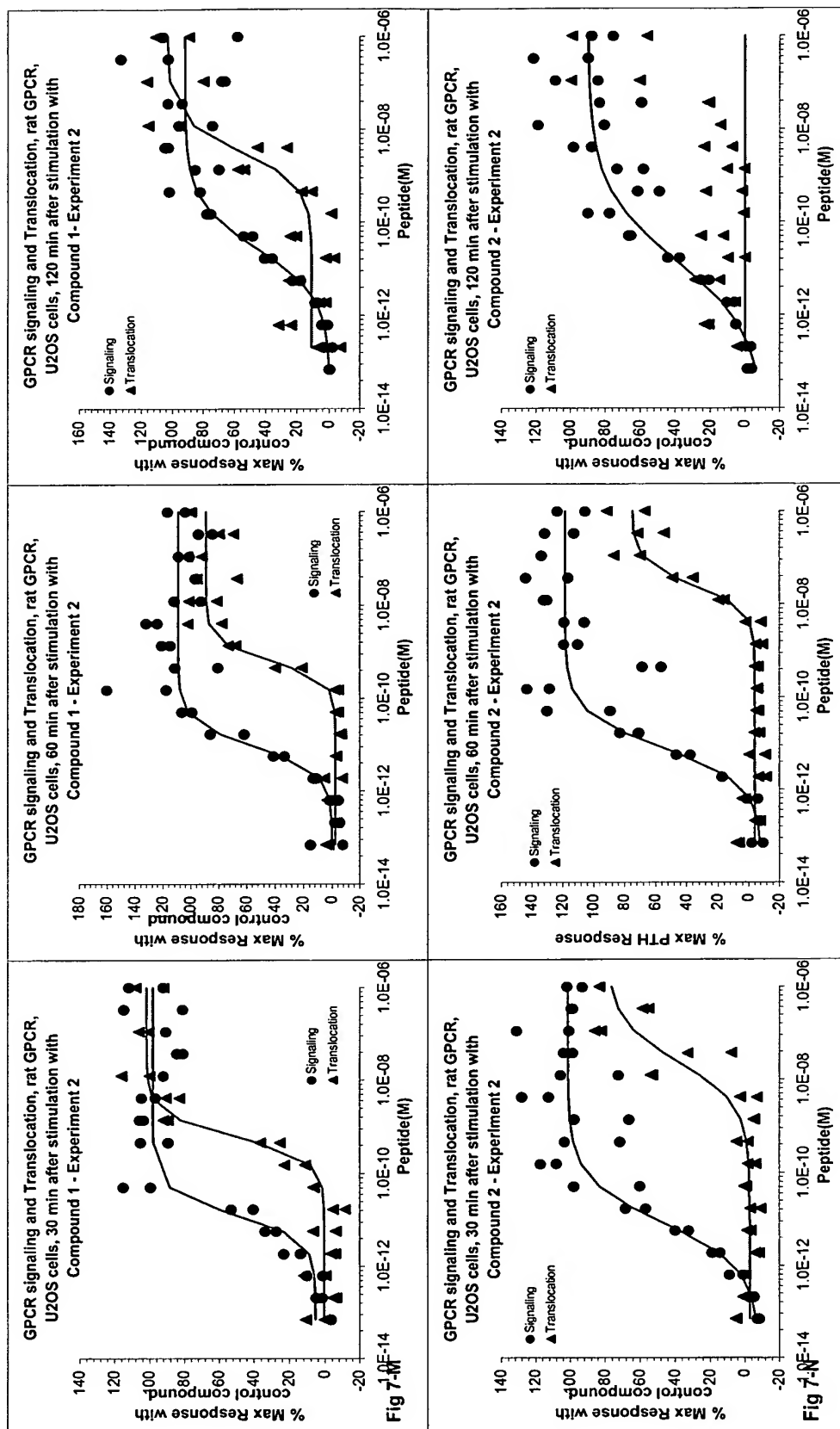


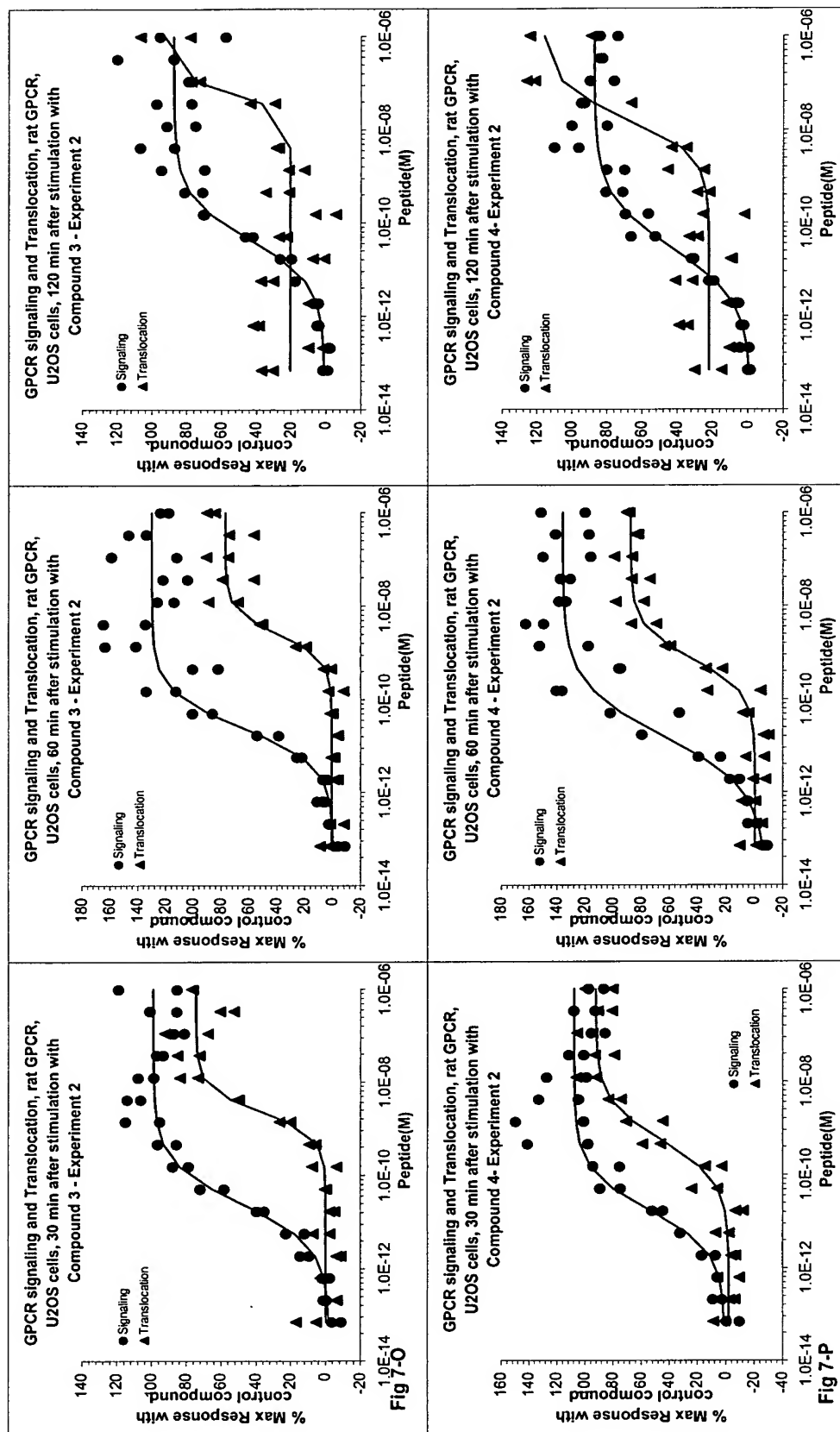


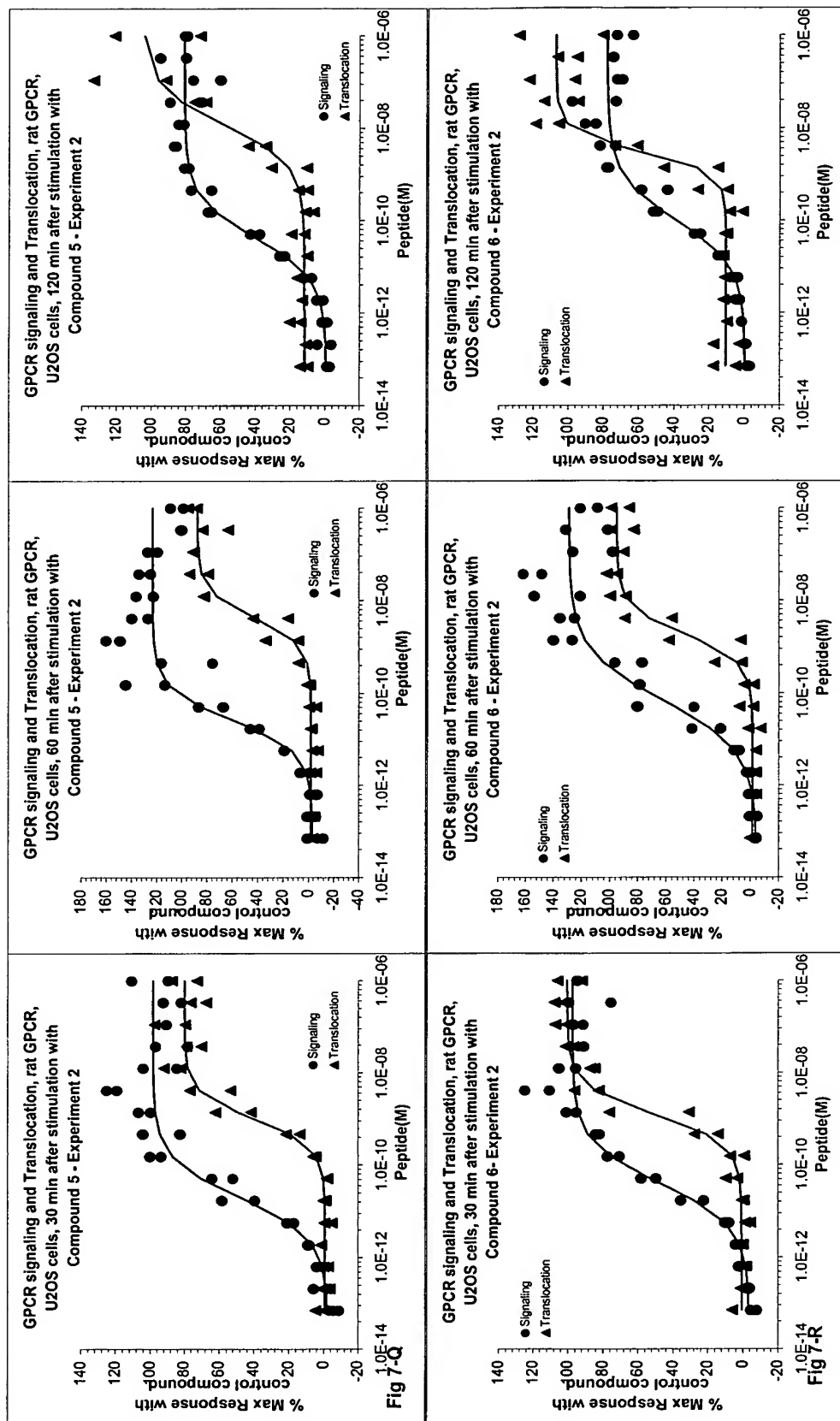


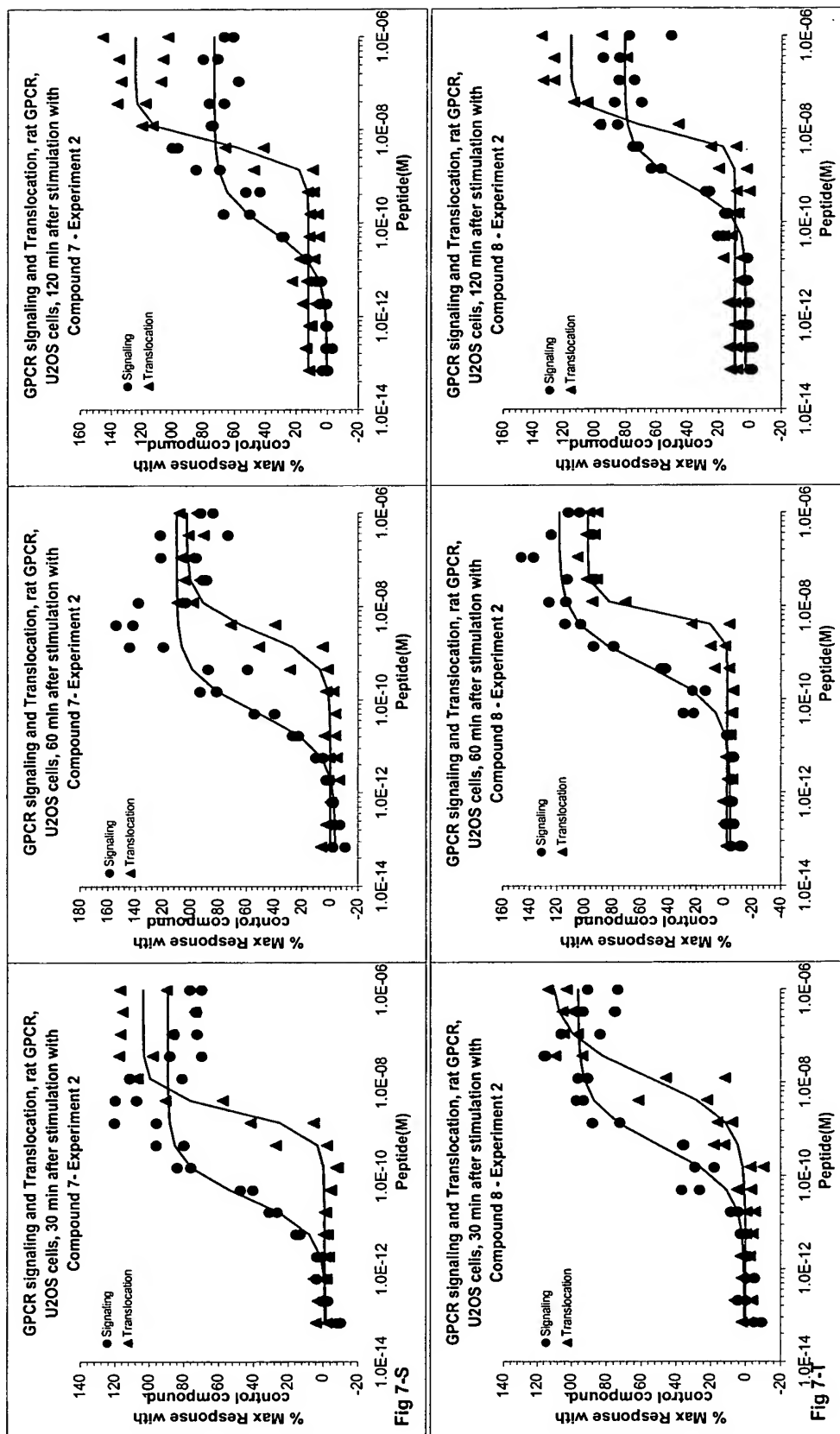


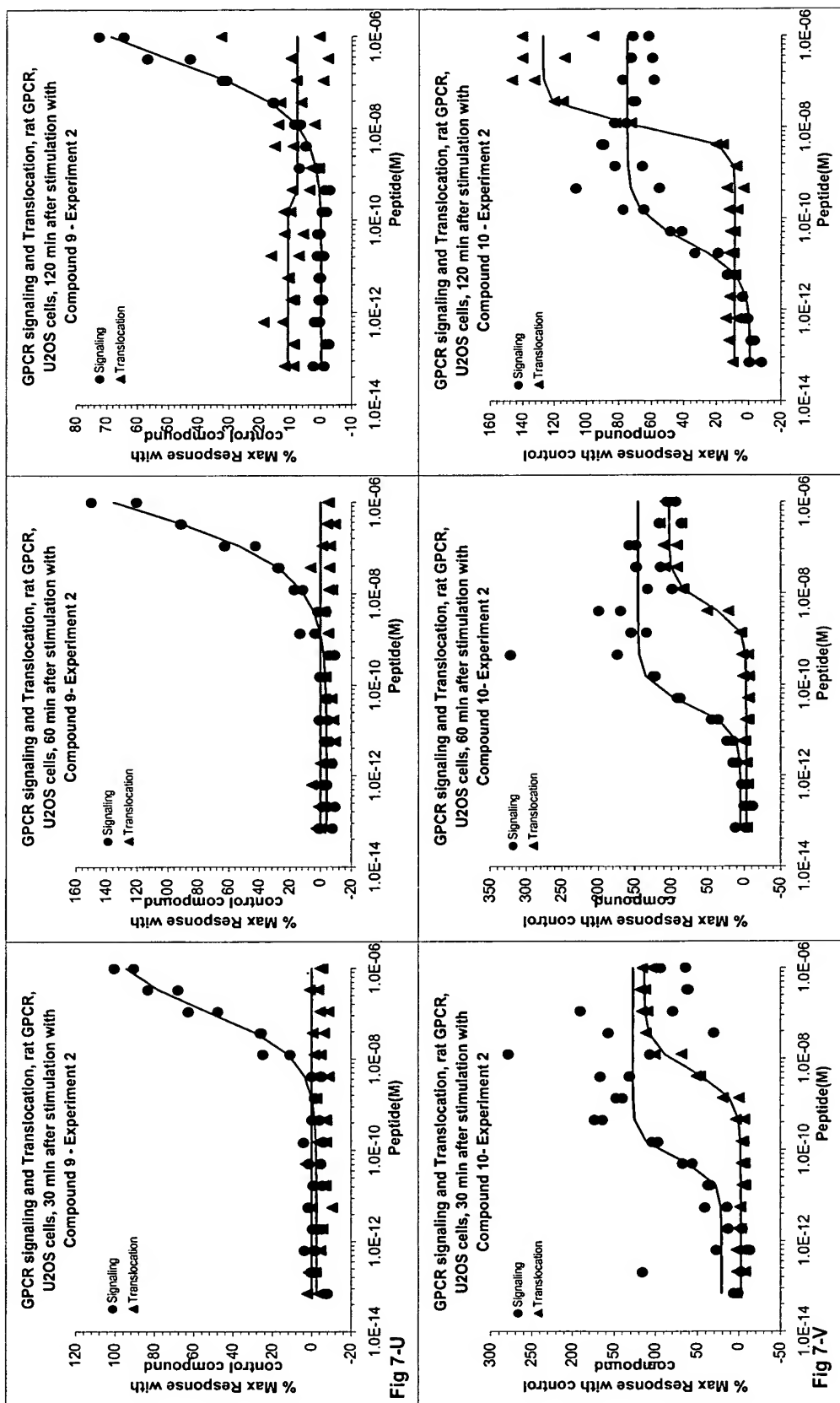


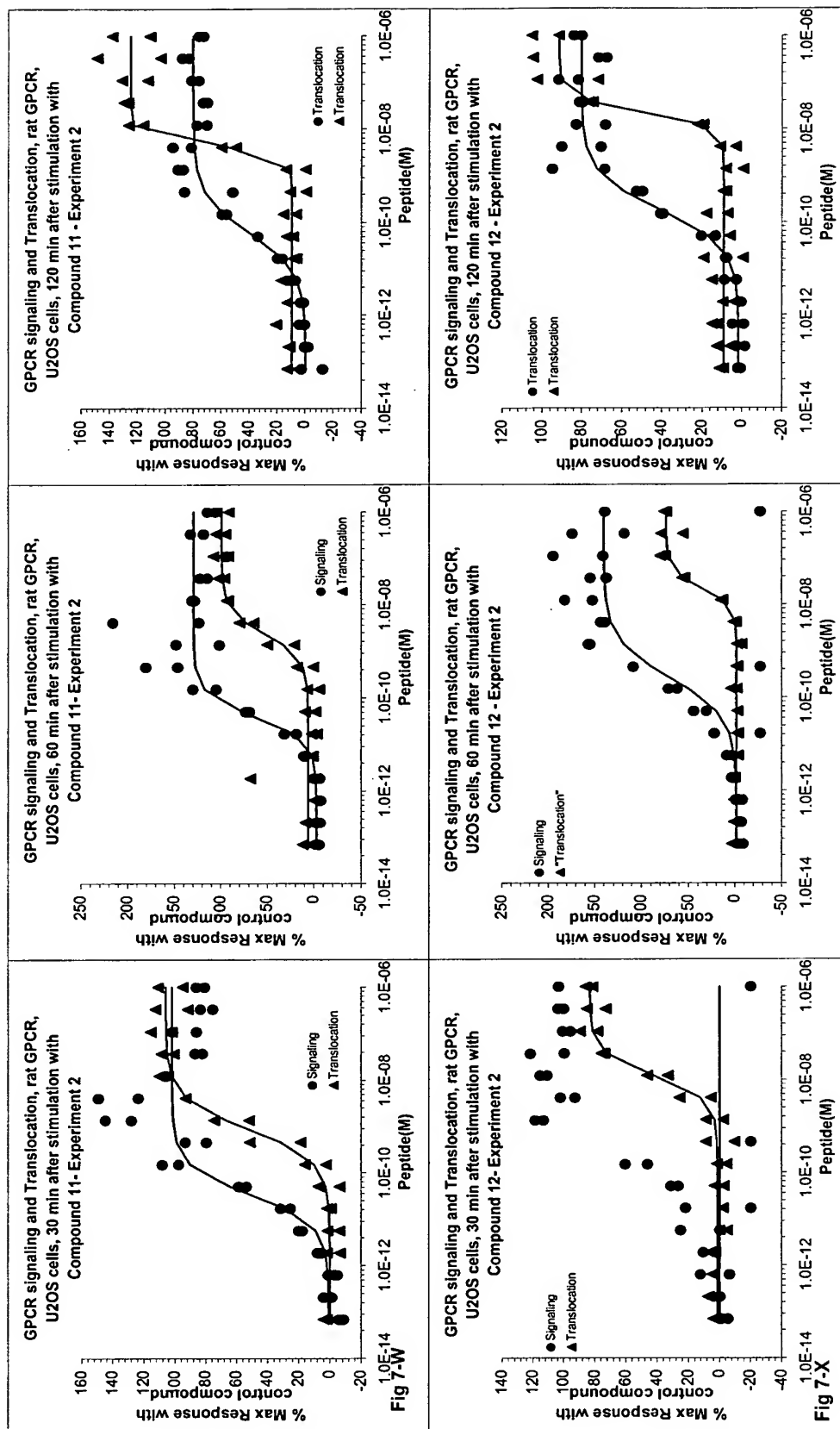












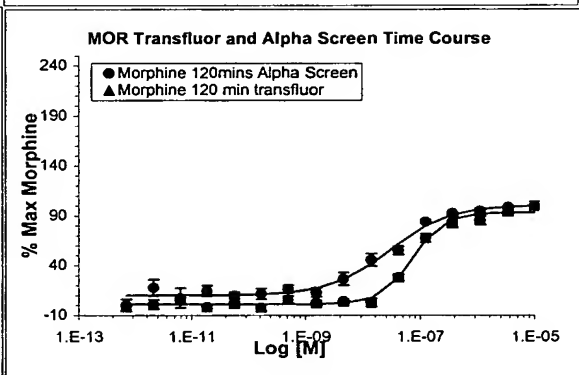
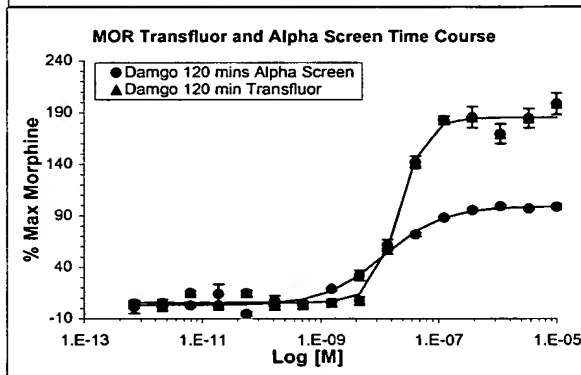
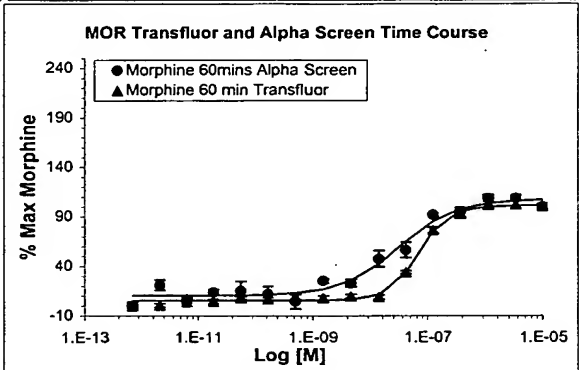
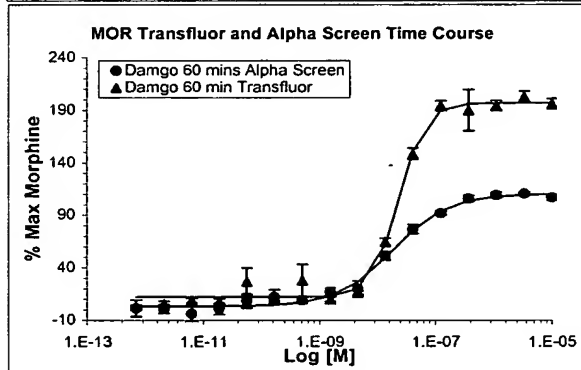
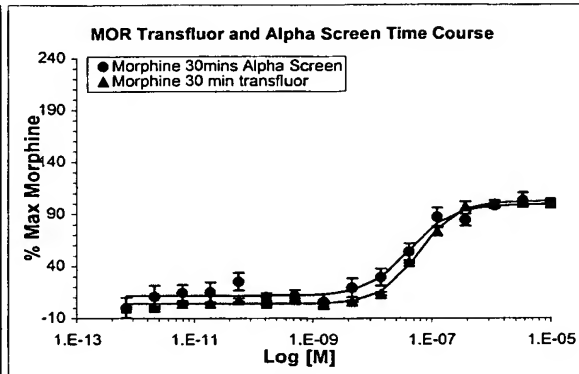
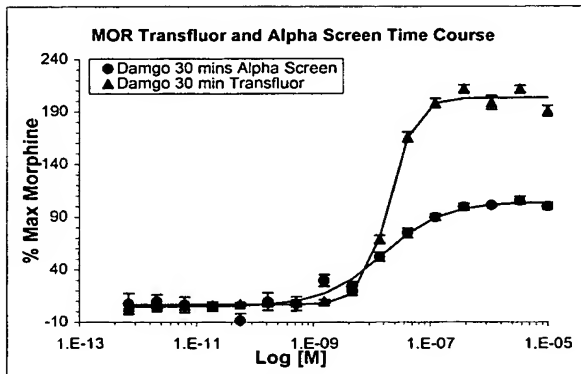


Fig 8-A

Fig 8-B

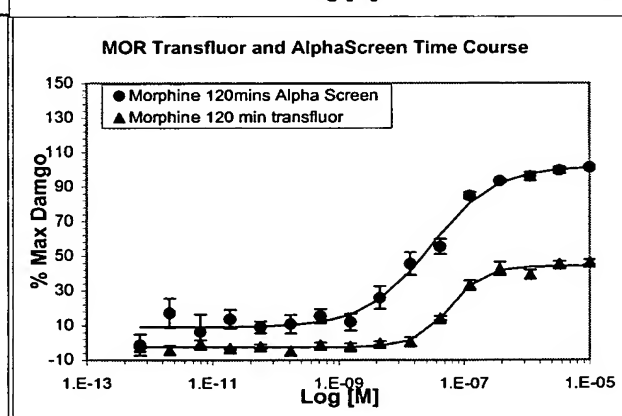
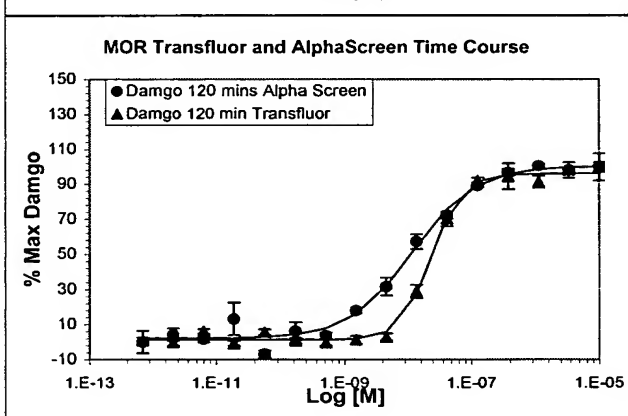
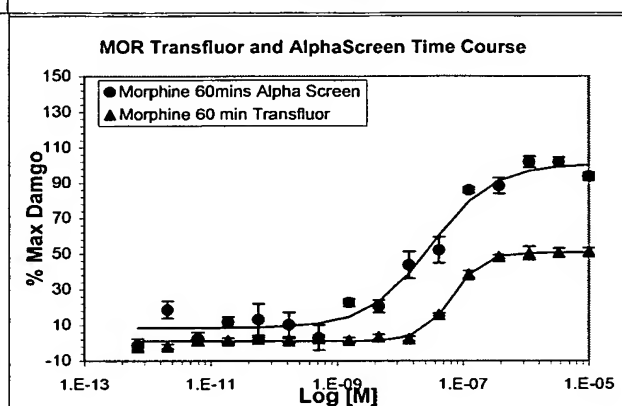
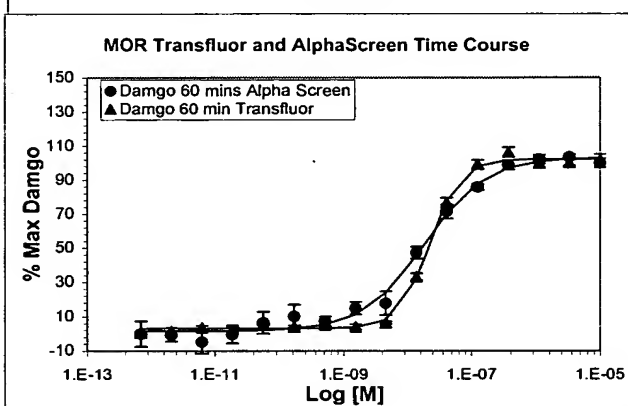
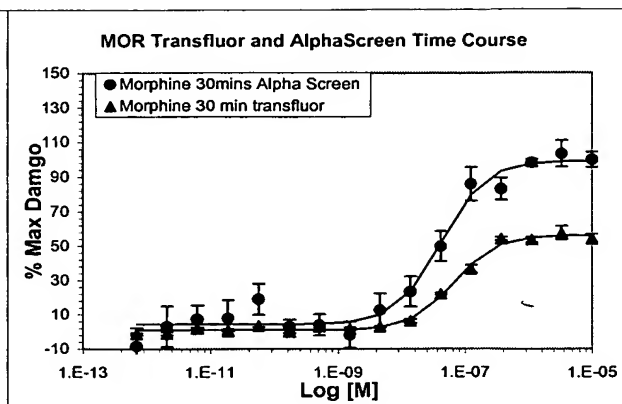
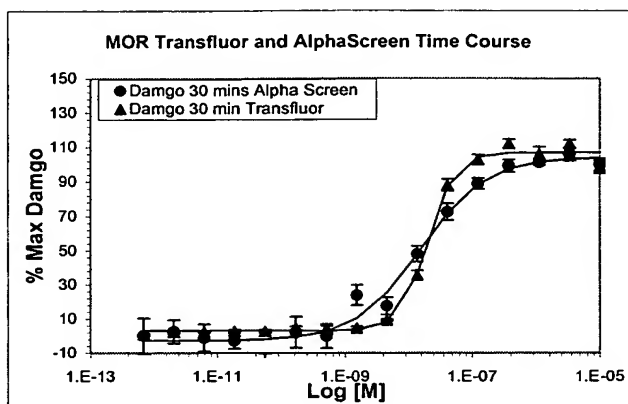


Fig 8-C

Fig 8-D